Department for Transport

GOOD PRACTICE GUIDE 341

Telematics Guide

transportenergy BESTPRACTICE

GOOD PRACTICE GUIDE 341

FOREWORD

Intelligent Transport Systems (ITS), of which telematics is a sub-section, have the potential to support sustainable mobility and distribution. They provide the underpinning tools and mechanisms to enable better network management, to ensure safer vehicles, to assist drivers before and during trips, and to make travel a more enjoyable experience for us all. The UK Government is encouraging the greater adoption of ITS as an integral part of its 10 Year Plan for a modern transport system. The challenge for the Government is to create legal, economic and administrative frameworks for ITS deployment. These frameworks should be sufficiently flexible to encourage technological innovation and shared learning through experience, while also minimising the risks that rapid technological evolution might bring. Government alone cannot bring about a culture change towards greater deployment of ITS but it can and does support and encourage greater take-up of ITS solutions. The production of this Good Practice Guide is part of this strategy.

More information can be found at www.dft.gov.uk

This Telematics Guide is part of a series of Guides prepared for the Department for Transport under the TransportEnergy Best Practice programme.

Prepared by:
AEA Technology plc, Harwell, Didcot, Oxfordshire, OX11 0QJ and
GoTelematics, PO Box 543, Winterton Way, Shrewsbury, SY3 5WG.

CONTENTS

1 INTRODUCTION

This Guide provides practical information to truck operators on the ingredients of road transport telematics systems.

Telematics is one of those words that has a different definition depending on who you speak to. More precisely, it's definition is dependent on the market or sector you are in. There is, however, a simple definition that covers all applications:

"The use of computers to control and monitor remote devices or systems."

By far the largest market area to date for telematics is the transport market where vehicles and trailers are the remote devices which are controlled and monitored.

State-of-the-art telematics systems provide the haulage industry with a revolutionary opportunity to manage their asset more efficiently. Proper use of these systems can lead to significant improvements in fleet productivity and efficiency, reduction in fleet mileage, operational cost and fuel consumption. These effects also reduce the environmental impact of truck operations and improve their safety. However, telematics systems are not a substitute for careful fuel management and driver training, though they are usually complimentary. Careful management of your operation either by telematics or otherwise is the key to productivity and efficiency. The valuable financial and customer service benefits that are available through the proper use of telematics are not in doubt. Though, perhaps understandably, the list of claimed benefits can sometimes be implausibly long and over-stated by suppliers seeking differentiation from their competitors. To help you see beyond this marketing and actually choose a system that is right for you, this Guide describes the real benefits associated with a particular application. It also gives details of the functions of different categories of telematics systems.

The Guide does not try and give a complete assessment of every technology and application on the market today. Rather, it gives examples of the type of technology available and advice on which issues you should watch out for when buying a system. It also highlights how you use this technology and the information you get from it, and what return you could expect.

How this Guide is Organised

The rest of this section describes how you can use this Guide to maximise the advice and information available to ultimately decide if telematics is right for your particular operation.

There are around **70 companies** that supply products that could be described as commercial vehicle telematics systems in the UK today. Each of these suppliers offers various combinations of three basic components:

A. Hardware – the equipment that is physically fitted to your trucks and into your office that collects the data
B. Data Transfer – how any data collected is transmitted from the vehicle to the office (or vice versa)
C. Software – how this data is changed into useful information for your business

Section 2 provides a brief overview of the sorts of technology that can be fitted to your vehicles (the hardware). It also describes how the vehicle might communicate with its base (data transfer) and how the data is manipulated and presented (by the management software).

There are a wide range of solutions available that combine different aspects of these three components. In this Guide we have divided these solutions into the following specific applications:

- Vehicle and Driver Data
- Vehicle Tracking
- Trailer Tracking
- Text Messaging
- Paperless Manifest and Proof of Delivery
- Traffic Information
- On-Board Navigation

Section 3 is the main part of the Guide. It discusses each of these applications in turn, with reference to the three components required and the associated benefits to your operation.

INTRODUCTION

Emphasis is placed on fundamental time or cost savings rather than overall benefits such as "increased productivity" and "improved efficiency". Obviously some suppliers offer integrated systems with multiple functions. For example vehicle tracking and text communications are natural partners.These links are emphasised throughout this Guide. Converting the data collected by on-board systems into information that you can actually use is the key to a successful telematics application. This is the role of the management software. Appropriate software will help you manage your vehicles, drivers and operations far more effectively than before. **Section 4** describes the features you should look for when selecting software. Also included are four recent case studies describing how particular operators have used telematics and the benefits they achieved. As in any business, there is little point in buying new equipment unless you can demonstrate a return on this investment.

Suppliers of telematics systems must have skills and resources not only in the specification and manufacture of the **on-board hardware**, but also demonstrate expertise in the areas of **communications** and **software development** and support. **It is important therefore when selecting a supplier to consider their product as a whole and not to become blinded by attractive vehicle equipment or colourful maps!** With this in mind, **Section 5** gives a list of points that you should consider in the process of making a decision. Choosing the right product and supplier for your business is an important issue, and you should devote time to identifying your business needs before contacting any suppliers.

Once you've decided which system is right for you, the next phase is to incorporate it into your current operation. **Section 6** gives information on how to go about making an implementation plan, so that both you and your staff are aware of what changes are about to happen and how to review progress.

A list of the contact details of the various suppliers is given in **Appendix 1**, together with the applications offered by each.

A glossary of terms is given in **Appendix 2.**

How to use this Guide

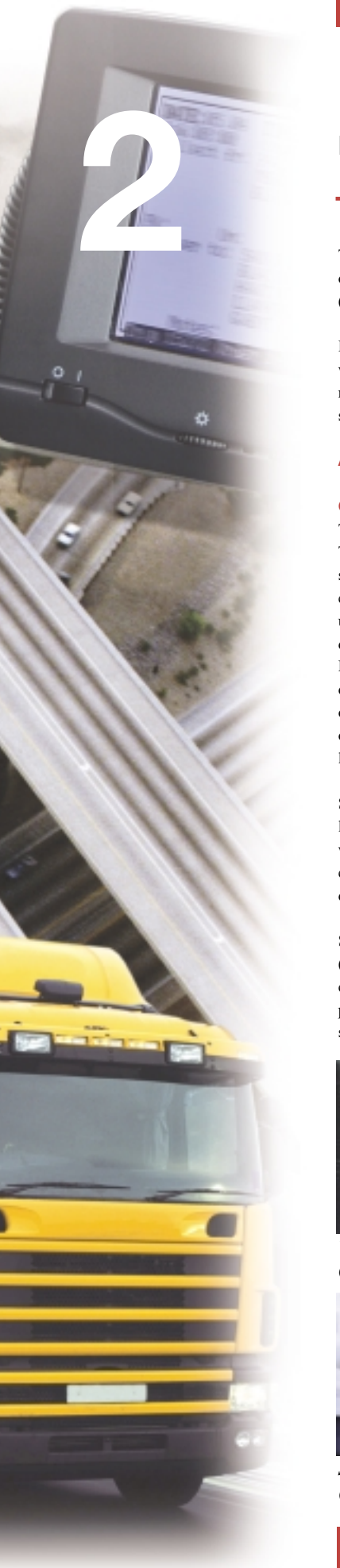
1. Conduct a review of your business needs, identifying areas where telematics could be helpful
2. Use the first part of Section 5 "Your Company and Telematics" to review if your company can realistically implement a telematics system
3. Use the table from Section 5 to see which applications would suit you best
4. Read the corresponding categories in Sections 3 and 4 to find out more
5. Read the case studies to see if there are similarities between your operation and those reported
6. If you're still confident that telematics is right for you, go through Section 5 in detail
7. Make a short list of suppliers
8. Understand what sort of management software will give you the information to meet your business needs
9. Make a list of questions you need a potential supplier to answer and invite them in to present their case
10. In parallel, make an implementation plan

Other Sources of Information

TransportEnergy Best Practice provides a wide range of information to help you improve the efficiency of your operations. Guides, case studies and videos are available on a range of topics such as fuel management, driving for fuel economy, aerodynamics, logistics and key performance indicators of vehicle utilisation. For a full list and description of all the available resources visit our website at **www.transportenergy.org.uk/bestpractice** or call our Helpline on **0845 602 1425**.

One publication of particular relevance to this Guide is Computerised Routing and Scheduling for Efficient Logistics (GPG273). This describes the use of stand alone software packages designed to optimise journey planning and vehicle delivery schedules. Increasingly these applications are being linked with the mobile tracking systems and on-board computers described in this Guide to provide real time routing and scheduling opportunities.

Specific details about transport telematics can be obtained from the UK Association for the promotion of Intelligent Transport Systems, ITS United Kingdom, Suite 412, Channelsea House, Canning Road, London E15 3ND Tel: +44 (0)20 8519 1222 Fax: +44 (0)20 8519 1717 mailbox@its-focus.org.uk http://www.its-focus.org.uk



2

BASIC TECHNOLOGY OVERVIEW

This Section provides a brief overview of the sorts of technology that can be fitted to your vehicles (the hardware).

It also describes how the vehicle might communicate with its base (data transmission) and how the data is manipulated and presented (by the management software).

A. On-Board Hardware

On-board computer

This is usually the heart of the system in the vehicle. They exist in as many forms as there are system suppliers, but don't panic you don't need to know everything about it! Basically it is a small electronic unit containing software that reads and stores any data from the vehicle and/or reads a Global Positioning System (GPS) receiver and controls data communications. It might also accept data from other sources such as driver terminals. You can think of it as the vehicle's personal computer even if it looks nothing like the one you've got at home.

Some on-board computers like those shown on the left provide a trip computer function and interface with the driver in different ways. Others are simple electronic control units mounted beneath the dashboard.

Satellite tracking (GPS) and mobile communication (GSM) functions can be incorporated into the more capable driver terminals. These rarely have the physical connections to read vehicle or driver data, such as fuel consumption, speed and revs.

VeMIS on-board computer
(Picture courtesy of VeMIS Ltd)

Siemens VDO on-board computer
(Picture courtesy of Siemens VDO Ltd)

Fuel Flow Meter

These measure the amount of fuel used by the engine in older or lower gross vehicle weight vehicles not equipped with a CAN bus (Controller Area Network). It provides an important input to the on-board computer where better fuel management is an objective. Only a few telematics suppliers in the UK have the experience, skills and hardware connections to supply both effective fuel meters and process the data they provide into useful information.

Siemens VDO fuel meter
(Picture courtesy of VeMIS Ltd)

GPS Receiver

This is usually a passive device rather like a radio receiver. It reads signals from up to 12 satellites and can calculate the vehicle's position anywhere on earth to within 10 to 20 metres or 1 to 5 metres if differential GPS is used. A GPS receiver needs to have a clear view of the sky and is best mounted on the vehicle's roof or just behind the windscreen (the system supplier will be able to provide you with advice on this).

If the receiver can "see" the signal from three satellites it is normally enough to provide the computer with a location. Some mobile phones and driver terminals have integrated GPS receivers. Some devices can also transmit data back to base by satellite.

GPS will not typically work indoors or beneath ground. Some well-designed systems for security applications transmit the last position stored in the memory if the vehicle fails to receive a signal.

GPS receiver
(Picture courtesy of VeMIS Ltd)

BASIC TECHNOLOGY OVERVIEW

2

Communications Module

Yet another small sophisticated box of electronics and software normally supplied by the cellular network or "air-time provider". It acts as the gateway between the vehicle equipment and the communications network. There are several integrated communications and GPS modules available.

Driver Terminal/Keypad

There are many different hardware options in this category. The larger global suppliers for warehousing applications have developed many different rugged terminals. Some of these are now beginning to find their way into the cab. Smaller telematics suppliers have developed excellent terminals aimed specifically at truck operations.

High volume and low cost consumer PDA (personal digital assistant) products have also found their way into the cab. You should consider carefully whether such options are suited towards your business needs.

Psion Netpad
(Picture courtesy of
Psion Teklogix (UK) Ltd

Driver terminals are usually made up of a screen and keyboard, or a smaller keypad. They allow the following applications (though not necessarily all at the same time).

- Two way text messaging
- Electronic manifest display, modification, notification of errors, shortages, breakages, and real time confirmation of deliveries.
- Route advice (though not commonly turn-by-turn navigation)
- Bar code scanning
- Driver-entered operational information – start time, loading, delays, waiting time, offloading etc
- Electronic timesheet information

Symbol Portable
Data Terminal
(Picture courtesy of
Symbol Technologies Ltd)

Navigation Module

An in-cab display or electronic module providing the driver with turn-by-turn instructions to the destination either graphically, verbally or using both methods. This service can also be provided via a GPS-equipped mobile phone.

VDO Dayton Navigation Screen
(Picture courtesy of Siemens VDO Ltd)

2

BASIC TECHNOLOGY OVERVIEW

Trailer Tracking

A stand-alone unit dedicated to trailers. They are usually mounted in a waterproof and preferably discrete and secure box (for load security applications). These boxes are self-contained and include a GPS receiver, communications module, control electronics, and batteries.The batteries are charged while the trailer is connected to the tractor unit. They should have enough power to operate for several weeks should the trailer be left standing.

Other equipment is available, including delivery note and invoice printers, bar code wands and terminals that can record customer signatures electronically for proof of delivery applications. Don't worry, not ALL the hardware described below would be fitted to your vehicles when you sign up for a particular telematics system! Not just yet anyway. In the future, more and more hardware will be integrated to increase functionality and reduce costs but even then you will need to seriously consider the downsides of throwing too much technology at drivers and traffic office staff.

B. Data Transfer

This is how data is transmitted to and from the vehicle.The best mechanism for your operation depends on how immediately the data is required, the coverage requirements, and how much you are prepared to pay for running costs. The most common solution is via a mobile phone network (GSM) or its offspring SMS (short message service). Two or three companies offer satellite data communications. If real time data is not required then data can be downloaded when the vehicle returns to base by wireless or direct cable connection.

The applications of different options are discussed in Section 3.

C . Management Software

The importance of this component of a telematics system cannot be over emphasised.This where the collected **data** is turned into **information** that will help you manage your vehicles, drivers and operations far more effectively than before. It may be a pure reporting package, it may be mapping and text messaging facilities, or it may be an order tracking system linked with ordering and accounting software. It can operate on a single PC, be available on your network or via a website. However most importantly it must deliver on-screen precisely the facilities you need without additional off-screen analysis on your part. It must also be easy to use, reliable and not too technical in appearance and operation.

Since software is the tool that gives you valuable information about your operation, getting a system that is right for you is key. Section 4 is dedicated to the features of this component of your telematics system.

BASIC TECHNOLOGY OVERVIEW

2

Flow of Information to and from the Vehicle

Data Flowing In

Without question the vast majority of data flows out of the vehicle. However, the table opposite lists particularly dynamic applications of telematics. These are aimed largely at helping the driver to do a better job (in terms of on time delivery at least) and to reduce paperwork, administration and scope for error. They also help you to meet your service level obligations and reduce communications costs.

Data Flowing Out

There is almost no end to the amount of data that can flow from vehicles by one means or another! The table opposite is not an exhaustive list but it does illustrate the data most commonly collected by operators that currently use telematics systems.

It is almost impossible, at least at reasonable cost and without serious training to implement a system that would be able to monitor all the data items shown below. You should identify priority areas of your operation before making these investments.

You should be as objective as possible before you select a specific product. Carry out an analysis of company needs rather than fall for the first product that appears sufficiently capable or looks good. Product selection should be influenced by careful prioritisation of business issues such as customer service, performance level reporting, overtime costs, administration costs, communication costs, security, trailer utilisation, fuel consumption and safety issues.

POTENTIAL DATA IN
Manifest – drops/addresses/route
Manifest modifications en route
Text messages
Voice – operations/turn-by-turn navigation
Vehicle disabling commands
Traffic status en route
Route recommendation and modification
System configuration/calibration

POTENTIAL DATA OUT
Vehicle or trailer location at calibrated intervals or upon request
Vehicle location when entering or leaving a “geo-fence”
Vehicle location when panic alarm triggered
Vehicle location when fridge or other alarm triggered e.g. off route
Confirmation of delivery specified in electronic manifest
Proof of Delivery - electronic signature
Consignment tracking – barcode etc
Text messages
Driver identification
Fuel consumption – trip/totals
Driving style – speed/revs/idling/braking
Timed trip data – start, stops, average speed, distance
Door openings – time/duration/location
PTO activity
Driving hours
Engine performance – e.g. temperatures
Trailer identification and mileage

3 TELEMATICS IN USE

3.1 Telematics for Vehicle and Driver Data

Introduction

Nowhere else do the words "if you can't measure it you can't manage it" hold so true. The main objective of these on-board data collection products is to provide information specifically about the performance of the vehicle and the driver. This will then help you improve vehicle MPG and benefit from related savings such as reduced maintenance costs, increased road safety and reduced insurance costs.

This is one of the longest established on-board fleet management technologies, it probably even pre-dates the invention of the word telematics! Most truck manufacturers now provide these types of products as original equipment. So, if you've bought a new truck in the last few years, it might be collecting this type of data already, you just need to know how to make the most of it.

A. Hardware

These systems are physically connected to tachographs, rev counters, CAN bus (Controller Area Network), fuel meters and often various electrical "inputs" from around the cab or chassis.

Due to the greater technical barriers to entry, there are fewer suppliers in this area than in other sectors. Most truck manufacturers now offer products of varying capability on their heavier range of vehicles coinciding with the introduction of the CAN bus.

How much fuel used by your vehicle is measured by connection either to a fuel consumption meter or, more common nowadays, connection to the CAN bus on top range vehicles.

You should be aware that you should not rely on the absolute accuracy of fuel meters to compare the performance of different makes of vehicles. This is especially true if you're going to make decisions about which brand of vehicle you're going to buy based on the results. Fuel meter accuracy varies markedly from one make of vehicle to the next depending upon the nature of the vehicle's fuel system plumbing and the character of the fuel return from the injectors!

Fuel consumption data from on-board systems is best used for analysis of trends when a fuel saving device or a training programme is put in place.

Driver Identification

Identifying which driver is in a particular vehicle at a given time is vital in any operation where drivers do not have a dedicated vehicle. Vehicle data is far less valuable if it cannot also be attributed to a driver who, after all, can make or break an inherently efficient vehicle. A positive means of identification such ask a driver card or key is best. If drivers are assigned a PIN number that has to be keyed in, then you should ask the supplier how they guard against an incorrect number being entered. Some suppliers have arrangements with fuel bunkering suppliers so the driver identification device can also be used to authorise fuel dispensing.

VeMIS Driver Identification Card
(Picture courtesy of VeMIS Ltd)

TELEMATICS IN USE

3

B. Data Transfer

There are several options available in terms of how the data is transferred (or "downloaded") from the vehicles to the office PC.

- Laptop or similar that plugs into the data collection unit on the vehicle. A comparatively expensive option for the convenience afforded compared to others, prone to damage and storage space needed.

- Using a cable into the side of the vehicle during fuelling. Inexpensive, technically reliable but out of date (American products were doing this 30 years ago), relies on the driver remembering the plug the cable in

- Data is transferred by the driver identification device (such as a smart-card). Inexpensive, technically reliable, depends upon the co-operation of the driver. Extracting the data from the driver identification device should happen automatically without operation of any software by the driver or other staff e.g. when the card is swiped in the traffic office.

- Data is transferred automatically by a wireless system operating within the depot boundaries. More expensive hardware required but automates the whole process. Data appears as if by magic on the office PC! Reliable if designed and configured well. No running costs. Only suitable for operations with vehicles that regularly returns to a base.

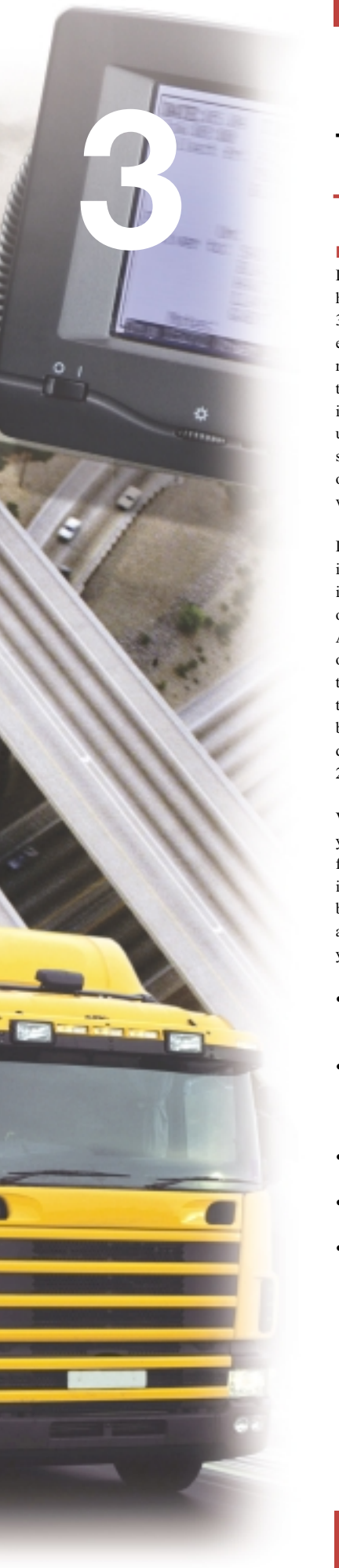
- Data is transferred by mobile phone networks, satellite or, less commonly, other real time proprietary means such as RAM, Paknet or TETRA. There is very little "mission critical" data available in these types of products UNLESS they include a vehicle tracking facility. Expensive option since you will be paying communication costs for the whole life of the product.You need to consider if the information is really needed in real-time. Ideal, however, for vehicles that rarely return to a base.

If vehicles are abroad and you want to look at vehicle and driver data during that time, then you will need a system using mobile phone or satellite communications. However, in most cases it is sufficient if data is downloaded by other means when the vehicle returns to base and the driver debriefed. Most on-board data collection systems have enough on-board memory to retain several weeks' worth of information before requiring downloading.

C. Management Software

How the vehicle and driver data is presented in the system's software package could be described as the business end of the product. If you operate more than, say, 15 vehicles, the last thing you want are reports that only provide information about single vehicles or drivers on a single sheet of paper. Analysis of this type of data will take up too much of your time and paper! Powerful exception reporting software will allow comparisons, trend analyses and benchmarking. See Section 5 for more details on this.

A small number of suppliers, including one or two truck manufacturers, are now making your vehicle data accessible via a secure website for a monthly fee. This can provide a more cost-effective solution than investing in your own reporting software, particularly for smaller fleets. This option will become increasingly feasible when the contract hire companies begin to offer similar services. There are seven or eight companies with the technical ability to access, process and present vehicle and driver data collected by these systems. These are generally well designed and offer excellent training and support services. These will allow you to make the most out of the data collected. Some vehicle tracking systems now also provide vehicle CAN bus connectivity.You should carefully examine how these integrated systems present the vehicle performance data on their reports and compare it to the equivalent reports from the companies that specialise in performance data collection. Choose the system that gives you the information you need in the format that suits you best.



3

TELEMATICS IN USE

Benefits

Don't underestimate the effect your drivers can have on fuel consumption! An average driver of a 38 tonne vehicle driving 80,000 miles a year can easily save £1,500 annually in fuel with the right motivation and little effort on their part. Multiply that by the number of vehicles you operate and add it to your bottom line to see the effect! Effective users of these vehicle on-board data collection systems regularly see average fuel savings of **5%** on the heaviest vehicles and up to **15%** on lighter vehicles not fitted with speed limiters.

Driver acceptability and ownership is important if driver performance oriented products are to be introduced. Ask any potential supplier for advice on driver training and motivational initiatives. An effective approach is to put the driver trainer or assessor in charger of the system. Analysis of the information provided will identify specific training needs, and the results of the training can be quantified immediately. With this kind of system driver trainers can focus 80% of their attention on 20% of the problem drivers.

Vehicle and driver monitoring systems will allow you to measure vehicle fuel consumption, and factors related to driving style such as speed, revs, idling and heavy braking, all of which have a bearing upon fuel consumption, maintenance costs and safety. By doing so these systems can help you to realise the following benefits:

- Reduced fuel consumption through monitoring vehicle fuel consumption rates to, identify losses and help specify vehicles correctly.
- Reduced fuel consumption through better driving. (These savings should not to be confused with AVL fuel savings which are achieved by reduced mileage and NOT better driving practices).
- Reduced accident rates that may lead to reduced insurance costs.
- Reduced maintenance costs through more sympathetic driving.
- Compliments driver training initiatives by identifying individuals who need training

3.2 Vehicle Tracking Systems

Introduction

Like systems that collect information about the vehicle, products that track the vehicle's movements have been around for many years. Initially these products (also known as Automatic Vehicle Location (AVL)) were used for tracking high security loads due to their relatively high cost. As communication and hardware costs have reduced, and with greater competition, this technology has become much more widely used for fleet management purposes by a wide range of vehicle operators.

Due to the vast range of products available it can be quite difficult for suppliers to differentiate themselves from their competitors, so selling efforts and techniques can be quite intensive! But don't let that put you off. Knowing where your drivers are, or have been, and communicating with them by text rather than voice can provide benefits that will transform your business.

A. Hardware

There are normally just three key hardware components in a tracking system. These are the on-board computer (going by various descriptions), the satellite signal (GPS) receiver and communications module. Several suppliers have integrated these into a single sophisticated module to reduce cost.

Vehicle tracking (or AVL) systems and text messaging usually go hand-in-hand because they share a common communications medium and if a supplier has developed a vehicle tracking system it is relatively easy to bolt in a text messaging facility.

This usually requires a screen and keypad to be fitted to the vehicle.

TELEMATICS IN USE

3

Unlike the vehicle and driver monitoring systems (Section 1 above) a standard vehicle tracking system doesn't collect any data directly from the vehicle. Any information on the speed of the vehicle is normally calculated with data from the GPS receiver that stores the time taken for a vehicle to travel between fixed points. Physical connections to the vehicle for this type of system are usually only a power supply and perhaps a simple **status input** such as a **panic alarm, high fridge temperature alarm** or anything else of operational or security significance.

Orchid Telematics Control Unit
(Picture courtesy of Thales Telematics plc)

B. Data Transfer

If you intend to use the speed data calculated from the GPS signal you need to remember that inaccuracies can be introduced. For example, if the clock on the receiver is not synchronised with the clock on the satellite. A tachograph connection is a more reliable method of calculating speed, after all it is legally calibrated and sealed.

A few tracking systems do have limited facilities for additional inputs to gather **data from vehicles** and outputs to provide a control function such as **vehicle disabling**. Some have connections for a hands free telephone facility enabling you to reduce your call costs if a mobile phone is already used.

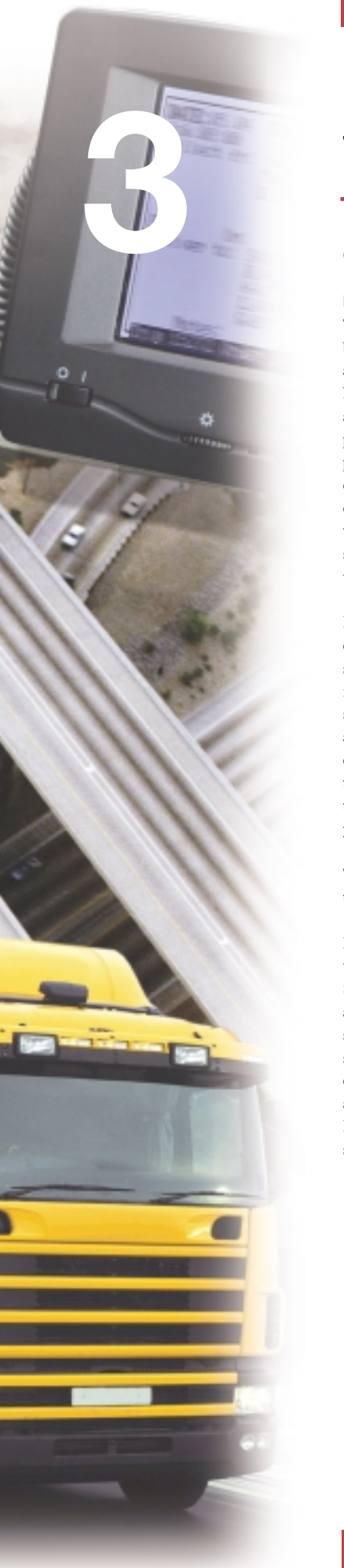
Various methods of communicating vehicle location and sending text messages are used. Most common are one of the big mobile phone networks (GSM or their offspring SMS provided by the installation of a SIM card (Subscriber Identity Module)). Some suppliers are experienced in the implementation of command and control systems for emergency services operators and from these you will hear of RAM, Paknet, or Tetra.

Of these, one or two will communicate by satellite to give worldwide coverage, and one by a combination of satellites and low-frequency beacons around the UK.

You don't need to worry too much about the technology that makes these systems work. You should focus more on their **COST, COVERAGE and RELIABILITY**.

In order to estimate the costs you should detail your **expected monthly usage**. For example, how many vehicle locations might you require, how many text messages are likely to be sent in each direction? Perhaps increase the results by 20% for prudence and then ask the suppliers for an **estimate of the communication costs**, preferably provided in writing rather than accept the salesman's estimate off the top of his head. Remember to ask for **roaming charges** to be taken into account if your vehicles will be overseas.

All suppliers can provide real time vehicle location data. However, before signing up for this type of system you need to make sure that you will **really** use this real time capability to its full effect. Have you got the resources to use it as a dynamic operational tool? Or are you only interested in historic data that you can use to playback or replay journeys to identify off-route mileage, examine arrival or departure times at customers' premises and gain other valuable benefits that can be achieved using data from yesterday, last week, or last month? If so you only need to consider a system that provides all the **retrospective vehicle location** information you need by downloading data from the vehicles when they are in the depot or yard. This can be done by transmission over a short range wireless data system similar to that used widely in warehousing radio data systems. The advantage of this type of system is that it doesn't generate any recurring communication costs.



3 TELEMATICS IN USE

C. Management Software

Map Software

The **mapping software** you will see demonstrated by telematics salespeople is normally acquired from a small number of third party specialist suppliers. Nearly all of these electronic maps come with attractive and useful features such as zooming, panning, place finding, and perhaps route planning. But be careful not to let these features distract you from examining the **"user-interfaces"** of the system. These will have been added by the telematics supplier's own software engineers (or sub-contractors) and are what you will have to work with if you fit the system.

Importantly, is the software easy to use? For example, if you double click on a vehicle icon shown on the map, what do you see? Does it make immediate sense? How many clicks does it take to send a text message to a selected vehicle? Where are the drivers' responses shown? Is there an electronic help facility or do you have to trawl through a manual? Are there "bells and whistles" that give an exciting demonstration but in reality you wouldn't use?

There are two basic types of maps available for telematics applications, **raster** and **vector**.

Raster maps are scans of maps we are all familiar with from reading colour road maps and Ordnance Survey maps showing terrain features. As a result they are easy to use and read. These can be converted into screen displays at relatively low cost. However the scanning and calibration process can introduce small errors so very often a vehicle appears to be in the sea adjacent to a coastal road or ploughing through fields! In general, raster maps are adequate for many standard fleet management applications.

Vector maps are drawn from real databases including street names and latitude and longitude coordinates of street intersections. They also include virtually all kinds of information you will need such as the location of bus stops, telephone poles, depot entrances, property boundaries, and low bridges. Vector maps are most valuable for applications where precision of location is required.

Their accuracy is best used in conjunction with differential GPS. They initially don't look as user-friendly as the more familiar raster maps but new users will soon begin to appreciate their merits including fast loading and greater detail during zooming in.

Reports

Most vehicle tracking systems will produce additional text or graphical reports, many of them very detailed including stop-start-time-location reports. These are generally not used in day-to-day operations because they require too much time-consuming analysis. However they can be invaluable if you are looking for a single piece of information such as an arrival or departure time or examining operating patterns to identify areas of inefficiency or inactivity. The real time data can be used for comparison with predicted scheduling. This usually requires integration with routing and scheduling software (see GPG273).

Due to the limited amount of data available to produce these reports some suppliers provide an add on driver input terminal that enables the entry of additional information such as LOADING, LEAVING DEPOT, ARRIVED AT CUSTOMER, REASON FOR DELAY, etc. This facility provides a much greater insight into operational patterns to help improve efficiency and productivity.

TELEMATICS IN USE

3

Internet applications are increasingly common. These allow you to view your vehicle locations and send text messages once you have logged on to a website using a standard web browser. These applications tend to have fewer features than full packages that sit on your local PC or network but on the other hand they have several advantages. Internet applications are particularly suitable for the smaller fleet operator, the main advantages are listed below:

- Lower initial cost since there is no software licence fee to purchase.
- Reduced training requirements due to reduced functionality.
- The version of the software is always up to date, managed by the supplier.
- New features added automatically again managed by the supplier.
- Connection available from your home or other locations if necessary

You will need a **broadband** Internet connection (ISDN at the very least) to ensure reasonable speed of operation. You should make sure that the data transfer and access processes are secure.

Warning of Imminent Delivery

Considerable improvements in productivity can be achieved by making sure that delivery points are aware that a vehicle is about to arrive. A small number of products provide a proven facility whereby a message can be sent to a pager or other device when the vehicle enters a geo-fence (a pre-defined area on a map) that equates to, say, 15 minutes driving time from the drop. Sometimes known as Ring Fence Paging, the depot or warehouse manager is automatically paged when the scheduled vehicle is within a specified distance or time enabling them to clear and prepare the appropriate delivery bay and ensure forklifts are available.

Security

Vehicle tracking applications can be used to deter and detect vehicle and load theft and improve driver safety. Typical security applications include:

- Panic buttons allow the driver to alert the base station instantly and discreetly of a serious security problem. Police can be alerted and the vehicle tracked minute by minute. This is known to be an effective tool, both in terms of load security and driver safety. Covert microphones are also sometimes used on high security applications such as cash transit.
- Remote vehicle immobilisation can be triggered when the vehicle circumstances change e.g. speed, route, time of travel. The immobilisation can be accompanied by door locking, flashing lights, and horn sounding but these systems are not easily installed and are typically only used on high security applications.
- Door opening can be recorded and tagged with time and location information. Unauthorised trailer door openings en route can be identified especially if supported by good exception reporting (see Section 4 for more details on exception reporting). Mounting reliable and secure switches on trailer doors and connecting these to an on-board computer in the cab requires expert engineering skills.
- Stolen vehicle tracking bureaux are provided by several of the larger vehicle tracking telematics suppliers. These can detect that a vehicle or trailer has moved outside a geo-fence outside a normal operating period. They will also track a vehicle on your behalf once you know it has been stolen. One product passes this information to police forces who are able to locate the stolen vehicle using suitably equipped police vehicles.
- Overseas vehicle theft is a risk. Drivers are vulnerable in a foreign country and an abandoned driver can be faced with difficult logistical problems. One product provides the driver of a registered vehicle with a single phone number to ring in the event of such an incident. Eurowatch will then liaise with police in the local language and track the vehicle using the data from tracking equipment fitted to the vehicle.

3 TELEMATICS IN USE

- Driver identification devices like those often used with vehicle and driver data products can double-up as a vehicle-enabling device connected to the immobilisation system or, more easily, having their own separate "ignition" enabling circuit. While they don't provide the ultimate security solution they can make things more difficult for the opportunist thief.

Benefits

The use of a vehicle tracking system, whether in real time or retrospectively, allows much more dynamic, hands-on management of vehicles and drivers. This will allow you to tighten up your operation in terms of reduced costs and increased customer service. The common and most valuable benefits are as follows:

- Reduced fuel and other vehicle costs by eliminating unnecessary or off-route mileage.
- Reduced overtime and night out costs by improved visibility of vehicle and driver activity.
- Driver timesheets are completed more accurately.
- Provides customers with notification of impending delivery – reduced waiting time.
- Improves customer service through "real time" visibility of arrival and departure and identification of problems en route.
- Provides data for confirmation of service performance levels.
- Provides data for comparison of actual with predicted scheduling - integration with routing and scheduling software usually required.
- Increased driver and load security via panic alarms.
- Reduced standing time and increased drops.
- Reduced cost of telephone calls to locate drivers.

3.3 Trailer Tracking

The widespread use of automated trailer tracking technology could save the industry millions of pounds every year. Trailers are historically the most under-managed assets in transport operations.

Vehicle tracking systems naturally initially focused on the vehicle itself, or the tractor unit. It was easier to apply these systems to the vehicle due to the availability of a power supply and the clean and dry environment of the cab.

However, it was quickly realised that a separate system was needed to monitor trailers. Trailers can be attached to your own tractor unit, pulled by sub-contractors, used as temporary storage facilities or stand empty for days on end in a depot or on a customer's premises.

Since trailers are difficult to manage, most fleets have a ratio of trailers to tractors that is too high resulting in depot managers having parked-up trailers "up their sleeves" for weeks, just in case. It isn't unknown for trailers to be mislaid and apparently disappear from the face of the earth.

Some of the larger multi-depot fleets have their staff carry out yard checks at the weekend to physically identify and count trailers and then fax the results to head office. But by the time this data has been collected it is out of date and it doesn't take account of trailers parked in areas other than the company's premises.

A. Hardware

Several telematics suppliers can track trailers to a degree via their in-cab equipment using connections across the cables to identify the trailer. Others are experimenting with radio links between tractor and trailer. They can populate a database with last known drop locations and pickup locations, but there is usually no data available for the journey between the stops. It is also notoriously difficult to get data between a trailer and tractor. Using wires within existing cables tends to be unreliable largely due to oxidisation of the connector pins which were never intended to take low voltage data.

TELEMATICS IN USE

An additional dedicated susie is a possible solution but your drivers need to make sure they connect it. Radio systems add cost and need very careful design and configuration so that equipment in a one tractor does not read and store the identification of half a dozen trailers parked next to each other.

Telematics suppliers are currently adapting the hardware of their tracking systems so that it will survive in a trailer where it may encounter extremes of temperature, road salt or steam cleaning. This involves total waterproofing, extreme robustness, and low power consumption giving the ability to operate for long periods with the trailer detached. The power for these systems usually comes from a long life stand-alone supply. It is also important that if the system is to be used for security applications it is not easy to find in the trailer and is resistant to destruction.

Several telematics suppliers can track trailers to a degree via their in-cab equipment using connections across the ISO 7638 connector to identify the trailer. Several products depend upon having their batteries recharged from live circuits on the trailer when it is attached to a tractor via this connector. There is some concern that this may result in the overloading of the cable, which could then cut the power supply to the anti-lock braking (ABS) system. Amendments to the regulations are being prepared to ensure that the ABS is protected in the event of a circuit overload. Most recent systems have rechargeable or disposable batteries with a life of two or three years that don't require power from the trailer. At least one product has solar cells intended to keep the battery charged.

B. Data Transfer

Communication is usually by conventional mobile or satellite communications. Monthly **running costs need not be high** if the system is being used just for asset management purposes in which case perhaps just one or two position requests a day would be required. The same methods as those described above for the Vehicle Tracking systems are usually applied.

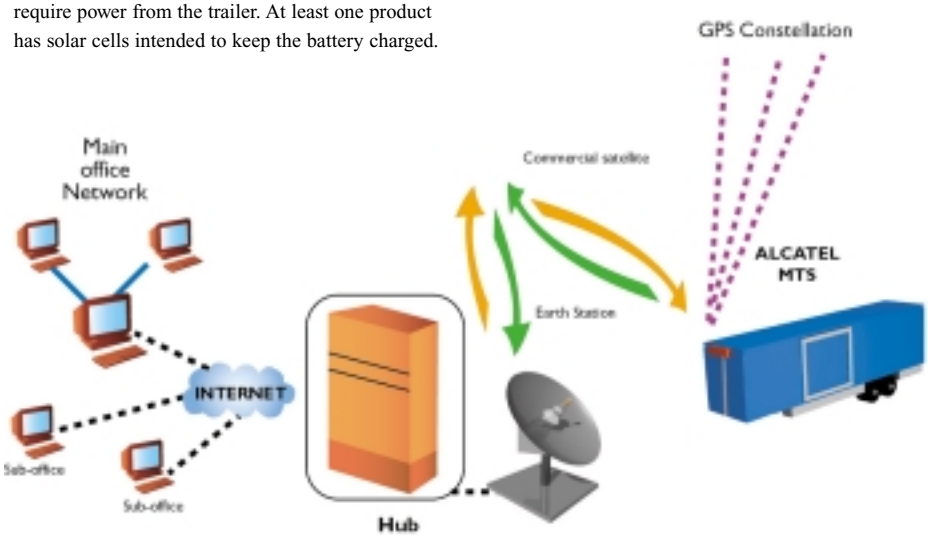
C. Management Software

Again, the same software applications as those described above for the Vehicle Tracking systems can be used to analyse the data.

Benefits

Telematics products will allow you to manage trailers more effectively as individual assets, to quantify their utilisation, to locate them instantly and view their history. They integrate trailers better into the operation of the fleet with the following benefits becoming available:

- Reduced trailer fleet size to the optimum
- Increased utilisation of the remaining trailer fleet
- Geo-fencing of high value loads for security
- Tracking of stolen trailers and loads
- Remote reefer temperature monitoring wherever the trailer may be
- Consignment tracking even when being delivered by sub-contractor



A Satellite-based Trailer Tracking System
(Picture courtesy of Alcatel Mobicom)

3 TELEMATICS IN USE

3.4 Text Messaging

Introduction

Sending text messages is cheaper than making regular telephone calls. It is also safer, more secure and concise, and text messages cannot be "missed" since there are clear records of them being sent and received. Staggering savings can be made when mobile phone calls are replaced by text messaging. Due to the amount of communication required for vehicle tracking applications, text messaging is a natural partner to this kind of telematics.

Text Messaging Screen
(Picture courtesy of Thales Telematics plc)

A. Hardware

There is a wide range of text messaging hardware available for in-cab applications from the humble mobile phone screen to devices that would not look out of place in the space shuttle. These complex systems usually consist of a regular "QWERTY" keyboard and a large display and provide additional functions such as electronic manifest.

B. Data Transfer

Not surprisingly, the mobile phone network (SMS) is the most commonly used medium for text messaging though a small number of suppliers do so via satellite communications or their own network of low frequency beacons.

C. Management Software

Most text messaging systems have a list of pre-defined, stored or "canned", messages for both driver and base to minimise the amount of typing required. This is a useful tool since drivers usually can't text as quickly as the average teenager!

While phone calls will continue to have their place in transport operations, text messaging will become more widely used as the hardware and software support increases and costs reduce even further.

Benefits

- Reduce the high cost of communications by voice (usually dramatically), especially international calls
- Reduce verbal communication errors
- Improve road safety

3.5 Paperless Manifest and Proof of Delivery

How many of the following sound familiar?

- Your drivers leave base each day with a paper manifest and a wad of delivery and advice notes, some of which already contain errors
- Constant time-consuming discussion with customers wanting to know the status of their delivery. You're unable to give an accurate answer without contacting the driver
- You don't know if your drivers are running on schedule
- You're unaware of what has been delivered and whether the customer has accepted it
- You're unaware of shortages or errors until the end of the day, delaying any corrections
- You're continually in dispute with customers over deliveries
- Your traffic office staff are stretched and constantly on the phone with drivers and customers
- You're unable to invoice until an error free and signed delivery note is manually entered into the accounts system

If several of the above apply to you then you would benefit considerably from the application of **paperless manifest** and proof of **delivery systems**.

Commercial vehicle telematics is largely about management control. The applications discussed so far have largely been concerned with fleet management applications. However there are several systems available that enable greater management control of pickups, deliveries and schedules. These systems are usually favoured by large multi-drop organisations such as parcels or home delivery operations. They allow manifest information to be loaded electronically into a driver terminal at the beginning of the day or "dynamically" throughout the day for greater flexibility. There are several levels of sophistication available, and different levels of integration into your business depending upon what sort of IT and accounting systems you operate. Several suppliers in the UK specialise in the supply of **paperless manifest** and

TELEMATICS IN USE

3

proof of delivery systems, occasionally combined with vehicle information and tracking systems to give total management control.

A. Hardware

Drivers usually operate a hand-held terminal, or a terminal that is permanently installed in the vehicle. The vehicle terminals usually have a larger screen making it easier to use and providing scope for additional functions. However the proof of delivery applications are more limited in this case since the customer needs to interact with the terminal either to sign or key a PIN. The mobile terminals are very robust; for example some are designed to withstand being dropped into puddles from cab height several times a week! Delivery, pickup and schedule information entered by the traffic office into a central system is downloaded into each driver's terminal by a variety of methods, the simplest being via docking cradles in the office. Alternatively, the communication methods discussed in other sections of this Guide can be used. To facilitate the loading of information onto the terminals each one might have a unique address on the company's computer network.

Electronic Ordering Screen
(Picture courtesy of VeMIS Ltd)

The manifest usually includes the drops arranged in a time-efficient manner a planned route if an interface to your routing and scheduling software has been arranged. Drivers can be included in the company's e-mail system and of course the terminal will normally be capable of displaying and sending text messages. Integral bar code scanners can be fitted to the terminal so that the driver can check goods on and off the vehicle.

At the delivery point the driver either confirms (by the press of a button) that a correct delivery has been made, or edits the electronic delivery form if necessary to record the reason for the failed or incomplete delivery. At this point the driver has confirmed with your company system that the delivery has been made but no proof of delivery has been received. Electronic signature recognition or a unique customer's PIN is normally used to obtain this.

B. Data Transfer

Receipt of this data back at base keeps traffic staff informed of the driver's schedule performance and of the status of each delivery. Immediate action can be taken to rectify shortages or errors and, where appropriate, the successful delivery data can be passed to the accounting system for invoice generation.

Some types of customers will require an advice note for their own records at the point of delivery. In this case an in-cab printer may be required.

If real time communication of delivery status would add little value to your business then you should opt for a system that downloads the data when the driver returns to base. One such option placing the terminal in a **docking cradle** so that complete details of that day's deliveries are transferred to the main system. While this is not as dynamic as the real time application it still serves to eliminate all the paperwork with its accompanying data transcription and administration, and the **time lag from supply to invoice** is still reduced significantly to the benefit of cash flow. And of course the communication costs are removed.

C. Management Software

Most of these systems are designed using "open system architecture". In simple terms this means that it should integrate with other ordering, stock management and accounting software already in use in your business. However you should be prepared for some **"software development"** costs since your business will be unique in many ways so electronic forms and links with other systems will need to be specifically designed and supplied.

Given that use of this type of system will change the way in which you work it is usually best if you implement the system in a phased manner, perhaps depot by depot if practical. An experienced supplier should be prepared to project manage the changeover and help make it a seamless exercise. For more advice on an implementation plan, see Section 6. In business to business operations don't forget the marketing opportunity to advise your customers of the proposed changes and the benefits to them!

3 TELEMATICS IN USE

Benefits

- Reduced paperwork and administration costs
- Reduced delivery and invoicing errors
- Improved order status information and consignment tracking
- Reduced delivery disputes
- Improved customer service
- Opportunity for immediate invoicing

3.6 Traffic Information Systems

Traffic Information Systems do not fall directly into the definition of commercial vehicle telematics systems as described in the introduction to this Guide. However, traffic information is globally recognised as an important element of telematics, particularly in cars, and the companies involved strongly and correctly market themselves as telematics suppliers.

You don't need to be told about what effect traffic congestion can have on journey times, so avoiding it can save you time and money. At the moment, the majority of us depend upon the RDS (Radio Data System) local traffic news that interrupts Terry Wogan informing us that the "M40 has been closed southbound between junctions 3 and 4 due to an accident". This information usually comes from the police or "Big Bob" the sales rep who is stuck in the traffic queue himself.

Traffic information systems are essentially a more sophisticated method of providing in-cab information about road congestion ahead and around the country. These are likely to play a greater role in the life of the long distance road user in future years. They can interact with on-board navigation systems, to provide details of a revised route around the congestion, but this type of application is primarily aimed at the car market, and their suitability for HGVs should be checked with the supplier before purchase.

A small number of companies are now using new automatic means to monitor traffic conditions including roadside infra-red sensors, cameras and "floating vehicle data". As well as being made available to the general public directly into our vehicles, this traffic information is also sold to vehicle manufacturers, mobile networks, broadcast media, internet service providers, distribution fleets and consumers. Suppliers of on-board navigation systems also use this information.

A. Hardware

Several levels of in-cab hardware are available depending upon the level of sophistication required. Many cars now have a Traffic Information System designed in as original equipment. In the mid range vehicles these will normally provide a voice warning via the radio speakers of traffic congestion two junctions or 12 miles ahead on motorways and trunk roads.

Alternatively, in-cab screens can display main UK roads with icons highlighting areas of congestion in the form of direction and average speeds. The screen is scrolled manually on this model until the area of interest is located. One particularly powerful product provides a full colour touch screen facility in which the auto-locate function causes the map to scroll as the vehicle moves.Traffic information is also available via the mobile phone networks.

Most on-board navigation systems (see next section) now also benefit from the receipt of live traffic data which considerably enhances their performance and value.

B. Data Transfer

The method used by traffic information systems to transfer data into vehicles is probably little more than academic interest since there are few suppliers and alternatives at present and the user does not directly interact with the transfer media.

This traffic information is sent to vehicles quickly and accurately, via GSM, private network or RDS-TMC (Radio Data System-Traffic Message Channel).

C. Management Software

Traffic information is intended directly for the benefit of the driver so of course there is no management software as such. On the other hand, it is possible for management to subscribe to a service whereby they can view UK traffic conditions on a small screen module at base or perhaps more effectively via the internet or on a company intranet. This could enhance command and control capability and allow traffic managers to re-route drivers in the event of congestion.

In the vehicle, if there is no link between the traffic information system and an on-board navigation system, your drivers still need local knowledge or a road map to avoid congestion. However the leading suppliers also offer a navigation service or product or partner with suppliers of navigation products to give you this service.

TELEMATICS IN USE

3

Benefits

- Provides the means by which drivers can identify and quantify congestion ahead so that an alternative route may be found
- Reduces delays, particularly when communicating with in-cab navigation systems
- Journey times reduced

3.7 On-board Navigation

The most widely used form of on-board navigation is still the torn and dog-eared road map. But it is not safe to read one while driving. One way to overcome this problem is to install an in-cab navigation system. These are likely to become more common over the next few years.

You've probably aware of the navigation systems that are available in luxury cars. These types of systems are also available as aftermarket equipment. Some of these aftermarket products are suitable for commercial vehicle applications. Marketing for these systems is usually aimed at the high volume car market but the technology is equally beneficial to commercial vehicles, if not more so in some cases. The most advanced systems provide the driver with guidance direct to a postcode or address. This option is definitely worth considering if your drivers are on home delivery operations or similar multi-drop work.

A. Hardware

The only hardware required is an in-cab display or electronic module providing the driver with turn-by-turn instructions to the destination either graphically, verbally or using both methods. One leading supplier simply provides a GPS module attached to a hands free mobile phone.

There are two main types of on-board navigation solutions, off-board server-based or on-board screen/CD–based. For server-based products, the supplier's central system is used to calculate the best route and this information is sent to the driver either all in one go or progressively throughout the journey. On-board systems require more sophisticated and more expensive hardware and software due to their need to store map data and calculate routes. This normally takes the form of a combined colour screen and CD player.

The main advantages of server-based systems is that they can readily incorporate live traffic information into the route planning and they are lower in cost.

This type of dynamic interaction with traffic information systems is available either as a 'factory fitted' or an 'after-market' systems, however these are primarily aimed at the car market, and their suitability for HGVs should be checked with the supplier before purchase.

B. Data Transfer

The limited number of navigation systems presently available use either a combination of GPS/mobile or GPS/RDS-TMC to perform their functions. The latter is presently offered as an option on some of the on-board combined screen and CD systems.

It is also important to remember that the mobile phone line remains connected (probably at premium rate), when blow-by-blow route guidance is relayed to the driver. Because of the potential high cost of this type of service customers can specify that connections are only made intermittently or for only the 'last leg' of a journey.

C. Management Software

Rather like traffic information systems, navigation systems are designed for the use of the driver, though of course they can provide real cost saving benefits to the fleet operator if drivers use them effectively.

Benefits

In-cab navigation, either server-based or on-board, has limited application in commercial vehicle operations compared to the systems described in previously in this section. However for certain types of distribution, such as home delivery the benefits could readily justify the cost. The main benefits are:

- Driver guidance direct to postcode or address eliminating delays in map reading and street hunting
- Journey times reduced - more drops
- Reduced overtime requirements
- Reduced driver stress
- Improved ETA information improves customer service

3

TELEMATICS IN USE

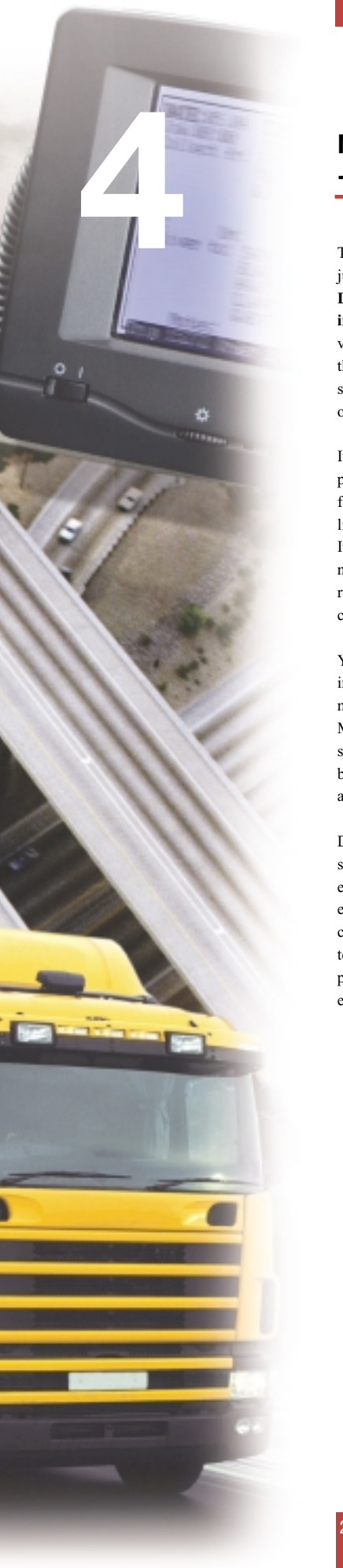
Summary of Functions and Benefits

Function and comments	Potential benefits
3.1 Driver and Vehicle Data • Provide data specifically about vehicle and driver performance - not normally provided by pure AVL products. • Provide data specifically about vehicle and driver performance - not normally provided by pure AVL products. • Most truck manufacturers now provide products as original equipment but only one or two lend themselves to larger fleet implementation. • Manufacturers products are not comparable yet with the better aftermarket products, which usually have better training and support services.	• Reduced fuel consumption through monitoring vehicle fuel consumption rates to, identify losses and help specify vehicles correctly. • Reduced fuel consumption through better driving. (These savings should not to be confused with AVL fuel savings which are achieved by reduced mileage and NOT better driving practices). • Reduced accident rates that may lead to reduced insurance costs. • Reduced maintenance costs through more sympathetic driving. • Compliments driver training initiatives by identifying individuals who need training
3.2 Vehicle Tracking Systems or AVL • Vehicles' positions can be viewed in application software or via the Internet. • Minimal hardware visible in the vehicle, GPS (global positioning systems) receiver and communications module. • Running costs must be examined carefully but fixed monthly cost systems are available. • Simple but effective given a well-designed reliable system that is used effectively by the vehicle operator! • Widely applicable to all sorts of fleet operations.	• Reduced fuel and other vehicle costs by eliminating unnecessary or off-route mileage. • Reduced overtime and night out costs by improved visibility of vehicle and driver activity. Driver timesheets are completed more accurately. • Provides customers with notification of impending delivery – reduced waiting time. • Improves customer service through "real time" visibility of arrival and departure and identification of problems en route. • Provides data for confirmation of service performance levels. • Provides data for comparison of actual with predicted scheduling - integration with routing and scheduling software usually required. • Increased driver and load security via panic alarms. • Reduced standing time and increased drops. • Reduced cost of telephone calls to locate drivers.
3.3 Text Messaging • A cheaper alternative to mobile phone calls • Hardware ranges from a simple screen, costing £250 to the more expensive QWERTY keyboard and large display.	• Reduce the high cost of communications by voice (usually dramatically), especially international calls. • Reduce verbal communication errors. • Improve road safety.

TELEMATICS IN USE

3

Function and comments	Potential benefits
3.4 Trailer Tracking • Provide data specifically about vehicle and driver performance - not normally provided by pure AVL products. • Individual trailer tracking requires a GPS receiver, data communications (which may be via satellite), and long life stand-alone power supply. • Data is transmitted to database software at the base viewed in application software or via the internet.	• Reduced trailer fleet size to the optimum. • Increased utilisation of the remaining trailer fleet. • Geo-fencing of high value loads for security. • Tracking of stolen trailers and loads. • Remote reefer temperature monitoring wherever the trailer may be. • Consignment tracking even when being delivered by sub-contractor.
3.5 Paperless Manifest and Proof of Delivery • Manifest information can be loaded electronically into a driver terminal at the beginning of the day or "dynamically" throughout the day for greater flexibility. • Usually favoured by large multi drop organisations such as parcels or home delivery operations. • Electronic signature recognition or bar code readers normally adopted. • Sophisticated in-cab/mobile terminal required combined with “real time” communications module if required. Terminal may alternatively download on return to base.	• Reduced paperwork and administration costs. • Reduced delivery and invoicing errors. • Improved order status information and consignment tracking. • Reduced delivery disputes. • Improved customer service. • Opportunity for immediate invoicing.
3.6 Traffic Information Systems • Provide in-cab information about road congestion ahead and around the country. • Potential to link to an in-cab satellite navigation system assisting with the identification of a revised route around the congestion.	• Provides the means by which drivers can identify and quantify congestion ahead so that an alternative route may be found. • Reduces delays, particularly when communicating with in-cab navigation systems. • Reduces delays, particularly when communicating with in-cab navigation systems.
3.7 On-Board Navigation Systems • Driver guidance direct to postcode or address. • Perceived by many as a luxury item but worthy of serious consideration on home delivery operations or similar multi-drop work. • Can be dynamic if routing advice is modified in real time through communication with Traffic Information Systems. • Lower cost hub-controlled voice systems are being launched.	• Driver guidance direct to postcode or address eliminating delays in map reading and street hunting. • Journey times reduced - more drops. • Reduced overtime requirements. • Reduced driver stress. • Improved ETA information improves customer service.



4 MANAGEMENT SOFTWARE - CHANGING DATA INTO INFORMATION

The software could be regarded as a tool that will justify your expenditure on a telematics system. **Data** flows into the software and is turned into **information** that will help you manage your vehicles, drivers and operations far more effectively than before. This is what you or your operations staff sit in front of to make sense of what is happening out there!

It may be a pure vehicle and driver reporting package, it may be a mapping and text messaging facility, or it may be an order tracking system linked with ordering and accounting software. It can operate on a single PC, be available on your network or via a website. However there are core requirements of all these packages that will be covered in this section.

You may want to your new telematics product to interface in some way with your existing traffic management or routing and scheduling software. Many salesmen will say this is possible but you should be careful about being tempted down this bespoke development route. For more information about routing and scheduling software see GPG273.

Don't be tempted to skimp on computer hardware specification. Computer costs are getting lower every year so buy the highest specification you can, especially if you're running mapping software which can be particularly memory-hungry and slow to load to the screen. You'll make improvements in staff productivity by spending just a few hundred pounds extra per machine.

It is important to remember that 80% of users will use only 20% of the features of a complicated software package. So after an impressive product demonstration you need to make sure that you (or your traffic office) will actually use all the "bells and whistles" in your day-to-day operation.

In the past software companies competed for sales primarily by increasing the number of features. More recently however, ease of use has become a crucial element for product success. This is normally followed closely by how quickly users can learn how to operate the system and the quality of supporting documentation.

Look out for software that may have been designed by "techies" in a darkened room having little contact with the outside world. Such software often requires too many key presses to achieve your objective, presents far too much detail on screen, has just too many "useful" facilities, and throws up odd error messages that mean something only to the chap who originally designed the database behind the program.

Beware, if the software turns out to be too difficult to use then it won't be used effectively and may even fall out of use completely. It may not become entirely redundant if it is integrated with your operations but in such a case your staff's time will not be used as productively as it could have been with a better designed system.

Having drawn your attention to the above we should point out that there are many excellent software packages available. However make sure you do compare the various options available to you, following the procedure of Section 5.

MANAGEMENT SOFTWARE - CHANGING DATA INTO INFORMATION

So what makes good telematics software?

- Easy to use, intuitive in operation, small number of key presses required
- Easy to learn, plain English used, not too many "useful" features
- High quality documentation, or a good key-sensitive help system
- Fast operating speed
- Appropriate exception reporting – see below

Many early vehicle and driver telematics manufacturers put far too much emphasis on creating their vehicle hardware and had limited experience of developing good software. As a result there was a temptation to present customers with as much data as possible because it was perceived as good value for money. While this type of product was capable of delivering benefits it required far too much detailed analysis and printing by the users.

In a product with good software, the bulk of the data will remain on the hard disk never to see the light of day unless accessed by an exception report.

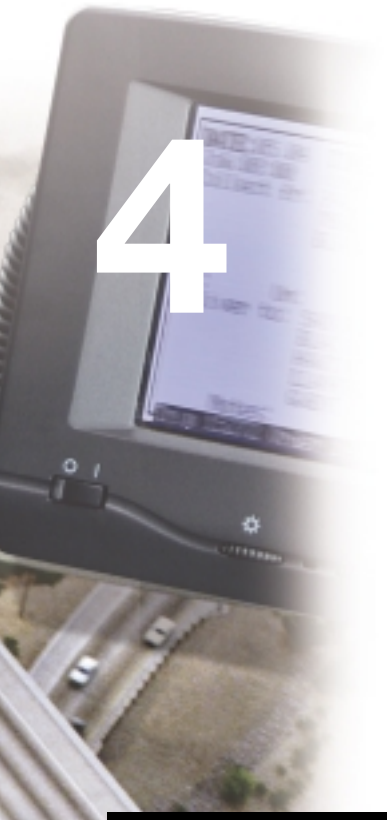
VeMIS For Windows V3.16

Driver Grading

ReportDate: Mon 10 Jun 02
Start Date: Sat 19 Jan 02
Finish Date: Fri 25 Jan 02

Rank	Driver Payroll Number	Driver Name	Main Group Name	Distance Travelled (km)	Idle Time	Total Points Scored: Above Econ Time	Over Rev Points	Over Rev Time	Speed Time	Harsh Brake Points	Driver Grading Figure
1	27834	G Scott		1537.3	100	100	100	100	100	100	100.0%
2	9914	G Ashworthy		1421.9	100	100	100	100	100	100	100.0%
3	42118	M Bundy		1237.5	100	100	100	100	100	100	100.0%
4	42347	J Griffiths		1180.0	100	100	100	100	100	100	100.0%
5	46252	S Heart		998.4	100	100	100	100	100	100	100.0%
6	21714	G Hodgeson		428.7	100	100	100	100	100	100	100.0%
7	42246	R Castle		286.6	100	100	100	100	100	100	100.0%
8	45706	D Featherstone		202.1	100	100	100	100	100	100	100.0%
9	42655	T Waite		509.4	100	100	98	100	100	100	99.7%
10	20111	A Rosewell		1112.8	95	99	100	100	100	100	99.0%
11	42649	E Elson		600.1	100	99	95	100	100	100	99.0%
12	45709	S Clarkson		878.3	100	100	99	100	100	93	98.7%
13	28182	S Waters		855.1	100	100	99	100	100	100	98.7%
14	46369	M Gentles		1750.9	93	100	98	100	100	100	98.5%
15	27530	S Stewart		1121.0	93	100	98	100	100	100	98.5%
16	43701	B Talbot		900.3	92	100	99	100	100	100	98.5%
17	20490	R Biles		1221.5	91	99	100	100	100	100	98.3%
18	42700	S Richards		1729.2	94	97	98	100	100	100	98.2%
19	20056	R Chapman		1355.3	99	100	99	100	100	100	98.2%
20	31804	L Hewitt		1819.0	98	100	100	100	100	100	98.0%
21	36050	S Davis		1181.4	89	100	99	100	100	100	98.0%
22	42010	C Jones		967.5	100	100	100	100	100	88	98.0%
23	42639	M Rosewell		895.3	88	100	100	100	100	100	98.0%
24	20293	L Hamilton		1845.1	90	99	97	100	100	100	97.7%
25	27525	L Pentecost		537.8	86	100	98	100	100	100	97.3%
26	27826	W Kelly		1682.8	97	98	91	100	100	96	97.0%
27	47309	A Cranford		343.0	99	100	100	100	100	83	97.0%
28	46129	M Redpath		591.7	83	100	98	100	100	100	96.8%
29	41774	J Marsden		1485.1	87	98	95	100	100	100	96.7%
30	9912	K Bartlett		1015.3	100	99	93	100	100	88	96.7%
31	45712	N Halesowen		2143.2	100	96	93	100	100	89	96.3%
32	45704	J Brown		1023.9	85	99	94	100	100	100	96.3%
33	42513	D Legg		993.1	94	98	91	99	100	94	96.0%
34	42509	S Coddsall		1454.9	79	99	96	100	100	100	95.7%
35	28540	M Heffer		715.0	81	97	96	100	100	100	95.7%
36	9915	N Hazell		1133.3	76	99	97	100	100	100	95.3%
37	27851	S Day		920.0	73	100	99	100	100	100	95.3%
38	20491	R Astley		1379.9	71	100	99	99	100	100	94.8%
39	44865	P Young		1152.5	69	100	100	100	100	100	94.8%
40	41885	M Michaels		806.0	72	100	100	100	100	93	94.2%
41	42245	T Turner		573.8	68	99	97	100	100	100	94.0%
42	20112	D Morris		664.9	74	98	91	99	100	100	93.7%
43	28531	P Murrey		394.1	78	99	97	100	100	85	93.2%
44	27949	H Styles		2042.3	85	98	88	99	100	85	92.5%
45	27927	M Fallow		1438.7	56	99	100	100	100	100	92.5%
46	20294	M Longridge		1664.5	89	98	93	100	94	78	92.0%
47	45826	P Humble		1764.2	52	99	99	100	100	100	91.7%
Fleet Totals:				75471.7	4933 Pts	7599 Pts	7069 Pts	7742 Pts	7718 Pts	4739 Pts	
Fleet Average:				967.6	63 Pts	97 Pts	91 Pts	99 Pts	99 Pts	95 Pts	90.8%

Typical Driver Exception Report
(Picture courtesy of VeMIS Ltd)



4 MANAGEMENT SOFTWARE - CHANGING DATA INTO INFORMATION

Well-designed exception reporting software will allow the user, with the entry of a date and a few mouse clicks, to effectively ask questions such as:

Which drivers of the Scania vehicles achieved less than 9.5MPG last month in the Barnstaple depot, excluding any fuel consumed during PTO operation and then graph the weekly trend? This is beneath the fuel consumption on which we costed the contract.

How many drivers had more than three heavy braking incidents per 100km driven on the white goods contract last week? I am concerned about product damage and safety and wish to organise defensive driving training.

Which of my depots had a vehicle utilisation figure of greater than our KPI of 36% last month so I can award depot manager bonuses?

Come up with some specific questions like these and ask any software provider to show you how their product can answer them. If they can't, then that's one supplier you can delete from your list.

The applications of telematics systems as a whole are limited only by your imagination but it is **up to you** to put them to best use. The **Case Studies** below illustrate how four operators have benefited in different ways through their use of telematics with management software tailored to their needs.

Case Study: Draycote Continentale Ltd and Dynafleet/Road Runner

Draycote operate a 35 vehicle multi make fleet of well looked after vehicles. Mainly a rigid and drawbar fleet fitted with tail lifts, they are employed on a multi drop operation distributing pharmaceuticals, papers and confectionery. Draycote's Managing director, Dylan Kent, had seen the inevitability of the expansion of e-commerce in the haulage industry and was attracted to the Volvo Dynafleet / Road Runner telematics system for the following reasons:-

- The Dynafleet system provided a comprehensive vehicle and driver track and trace and performance monitoring facility, whilst Road Runner allows Draycote customers to track their consignment over the Internet and obtain electronic proof of delivery (POD).
- It was backed and served by Volvo, the manufacturer of one of four makes of vehicle used by the company.
- The system was compatible with the other makes of vehicle in the fleet (Renault, Scania and Mercedes Benz)

Using a combination of the Volvo in-cab Dynafleet system and Road Runner software, Draycote are now able to analyse individual vehicle and driver performance, provide an internet consignment tracking facility for their customers and streamline their invoicing system using electronic proof of delivery. Road Runner has been particularly successful in satisfying customers by providing them with their own consignment tracking facility.

Real time proof of delivery now enables invoices to be sent on the same day which speeds payment and dramatically reduces administration effort and costs. However, this is not currently happening in all cases because some of the customers still insist on receiving a posted hard copy. Draycote are convinced that if more of customers would learn to have faith in the system and accept the electronic "proof of delivery" document, it would be a major improvement in operational efficiency. Dylan Kent adds:

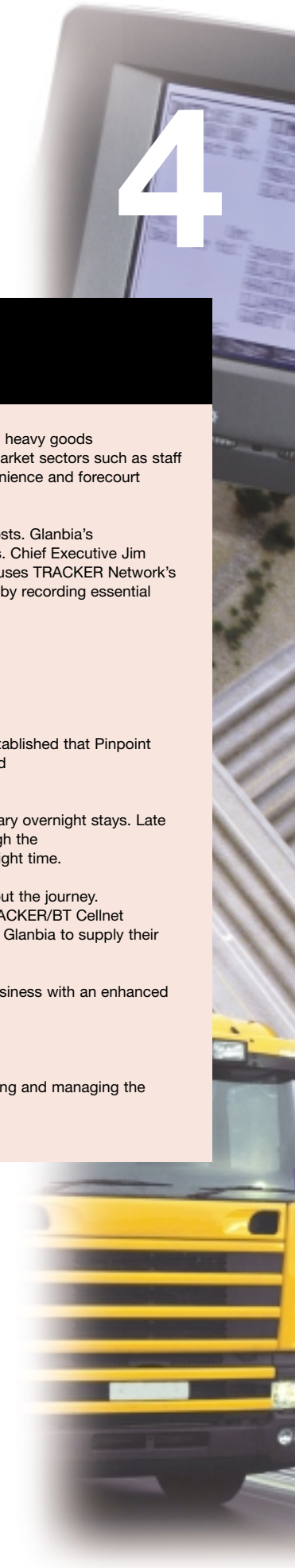
"It's difficult to understand why people insist on receiving a hard copy of the goods received document even though they probably accept their bank statement from a hole in the wall. Consignments are normally checked five or even six times during transit, so errors are unlikely"

Nevertheless, the system has dramatically reduced Draycote's administration workload. A recent 20% growth in business turnover, which is thought to have been partly due to the Road Runner customer consignment position information service, has been accommodated with no increase in transport office staff.

This reduction in administration workload has enabled the traffic office to undertake more profitable work such as analysing the additional information relating to individual vehicles and drivers of their road performance.

MANAGEMENT SOFTWARE - CHANGING DATA INTO INFORMATION

4



Case Study: Glanbia Food Services and Pinpoint Tracker

Glanbia Food Services is a fresh and chilled food supplier based at Tamworth, Staffordshire operating 120 heavy goods vehicles. Glanbia has a cold store warehouse and distribution centre that serves blue chip customers in market sectors such as staff catering, pubs, restaurants, hotels and leisure outlets. The company also supplies customers in the convenience and forecourt sectors of the retail food market.

After a £16 million investment in a new distribution centre, the company wanted to cut fuel and staffing costs. Glanbia's management judged this could be achieved by obtaining more detailed information about vehicle journeys. Chief Executive Jim Cooney and his team therefore decided to install BT Cellnet's Pinpoint Fleet Management System, which uses TRACKER Network's Communicator technology. The telematics system allows Glanbia to monitor its vehicles around the clock by recording essential data, such as:-

- Vehicle location
- Mileage and speed
- Fuel consumption
- Driver hours
- Temperature of goods in transit.

With an annual fuel budget of £2 million, Glanbia were particularly anxious to make savings here. Trials established that Pinpoint TRACKER could save Glanbia up to £200k a year by making sure that drivers can be re-routed quickly and efficiently, that they follow recognised routes at authorised speeds and that vehicle idle time is reduced.

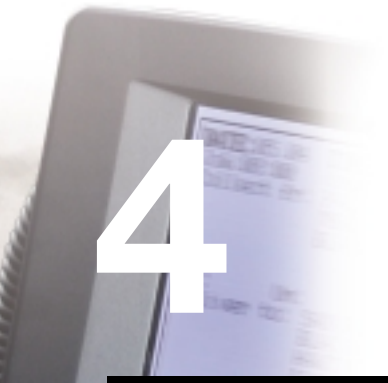
Drivers' habits also changed for the better as they began to return to the depot earlier, avoiding unnecessary overnight stays. Late delivery penalties, often due to a backlog of vehicles at the customer's site, could also be avoided. Through the system's management reports, Glanbia are able to prove that their vehicles were in the right place at the right time.

The most important element of Glanbia's service is to ensure that produce is in perfect condition throughout the journey. Most distribution vehicles rely on the driver monitoring the temperature of the goods in transit, but the TRACKER/BT Cellnet system warns Glanbia HQ if the trailer temperature falls outside a specified range. The system also allows Glanbia to supply their customers with records of the transit temperatures of goods.

Glanbia Food Service now has greater control over its operating costs and can continue to attract new business with an enhanced delivery service. The company is starting to inform its customers that an effective system is in place.

Steve Wadsworth, Distribution Manager at Glanbia, commented:

"The TRACKER/BT Cellnet system has given us far greater control of the operating costs involved in running and managing the distribution side of our business and demonstrates we are committed to customer service".



4 MANAGEMENT SOFTWARE - CHANGING DATA INTO INFORMATION

Case Study: Exel – A Storage and Logistics Contractor using Isotrak Transport Management System

Norman Coward is Exel's Depot Manager at their new 850,000 sq ft Bawtry site that serves a number of food manufacturers. He was responsible for introducing Isotrak's in-cab communication and information telematics system on 31 vehicles just two years ago. Today, he wonders how they managed without it.

When installing any new and evolving technology, it is difficult to accurately predict the potential cost savings. Exel, therefore, aimed to "wash out" the implementation costs through savings gained by more effective vehicle management. They realised that this would only work if everyone involved worked together from the outset.

Long-term agency drivers were included in the training and "wild-card" PIN numbers were configured for short-term agency drivers to provide the means to capture data for every trip.

From day one of the operation, five-minute meetings have been held within the Transport office to enable supervisors to focus on issues and initiatives arising from the operation of the new system. This allows the transport team to discuss trends with staff and to continuously improve the benefits in place due to the Isotrak system.

Fuel Saving Benefits
After installation of the Isotrak system, Exel have seen an audited reduction in fuel use of 7.2%, achieved by the analysis and control of two key elements:

- **Reducing idling**

From analysis of the Isotrak standard report, Exel identified that engine idle time was abnormally high. The major portion of this was discovered to occur at the start of a driver's shift, when the vehicle's engine was used to warm up the cab. Consequently all vehicles were fitted with night-heaters. The total idle time dropped dramatically by 90% and, through constant supervision has remained low.

- **Driver Training**

Exel have always had regular driver training assessment to ensure economic, safe and effective driver operation. But as a result of Isotrak's visible and audible indication of excessive engine speed, drivers have been made more aware of their actions in controlling fuel consumption. Also, since drivers are told at their debrief following every shift how much fuel they've used, they have begun to be competitive in terms of achieving better figures than their colleagues.

Customer Service Related Benefits
The terminals allow drivers to send standard text messages. Exel have set the system up to enable drivers to alert base immediately if there are any problems with the load when they arrive at the delivery bay. The message is acknowledged immediately, which enables the client to be contacted by Exel's customer services during delivery. The benefit of this immediate, real-time response is that loads, which would otherwise have been rejected by the "back door", are more likely to be accepted. The impact of this is that far fewer loads are being rejected and part-full trailers of returned goods are not compromising potential back-loads.

Driver Utilisation Benefits
The nature of and demands on Exel's operations dictate that they double and sometimes triple shift their vehicles. Drivers can encounter inevitable delays during their day, so second run drivers have to wait for units to return before they begin their shift. In the past this meant that some drivers had to wait so long that their scheduled deliveries were delayed.

The visibility of vehicles within the Isotrak system allows them to be rescheduled in real-time on the road so that a unit arrives back in time for a second run. Driver waiting time has been significantly reduced and the corresponding second run deliveries are made on time.

Due to inconsistent delivery patterns start times for a particular trip have always been subjective. Using the Isotrak software, Exel have been able to analyse the actual time taken from base to an individual location at different times of the day, and choose the most efficient time for a driver to begin their shift.

Previously, Exel supplied each driver with a mobile phone in order to communicate with base. However, with the text-messaging facility in the Isotrak system, these have become redundant. This system is not only more precise and immediate, but both parties have evidence of acknowledgement avoiding any argument relating to whether or not a call was made. This provided a substantial accountable saving.

MANAGEMENT SOFTWARE - CHANGING DATA INTO INFORMATION

4

Case Study: Tesco – An Own Account Company Using Isotrak Transport Management System

Two years ago, two Tesco distribution depots performed a trial of the Isotrak in-cab information and communication system. It proved so successful that all the distribution centres are planned to come on stream by the end of 2002.

As with other telematics systems, Isotrak provides detailed real time information concerning the driver and vehicle activity, identifying critical areas where management resource can best be directed. An important benefit for Tesco has been the ability to manage the effects caused by vehicles that are late leaving the depot. Ordinarily, vehicles leaving late could have a devastating impact, not just on that vehicle's delivery schedule but also on the following chain of vehicles and deliveries. The ability to manage changes to schedule in real time has helped Tesco to improve overall vehicle utilisation levels.

Another benefit is the system's ability to record and analyse the time each driver spends with the engine idling before starting out in the morning or during the off loading operation. Excessive engine speed and failing to maximise the use of cruise control are also areas that can be brought to the driver's attention by his supervisor on a regular daily and weekly basis.

There is a continuous interest in reducing the fuel each depot uses and Tesco have introduced someone at each depot to champion fuel efficiency. In common with other case studies, **fuel savings are of the order of 4 to 5%** which since Tesco's fleet has an annual mileage of some 120 million miles, corresponds to a saving of nearly £2 million.

Dislocation of the planned delivery schedule frustrates both drivers and store or distribution centre management. However, the Isotrak system can be used to partly resolve this problem by offering a "Ring Fence Paging System". Here the depot or warehouse manager is automatically paged when the scheduled vehicle is within a specified distance or time (such as 8 kilometres or 15 minutes) away from the depot. This enables the manager to ensure that the appropriate bay is clear and prepared.

Tesco report a good rate of acceptance of the system by the drivers and little resistance from the office staff particularly since no redundancies have been made in the office as a direct result of the system. Office staff are able to handle more work as the information that they are receiving is far more comprehensive, timely and accurate.

5 PRODUCT AND SUPPLIER SELECTION

Which Type of Product is Right for you?

With a wide range of suppliers offering a wide range of products, choosing the right option for your business can seem like an impossible task. But don't worry, help is at hand. The first thing you need to do is identify which problematic aspect of your business you would like to resolve. Use the table below to find out which type of telematics system you can use to solve these problems.

Pick a particular problem in the first column, and then look across to the white box on the right hand side. This is the type of telematics system that can address this problem directly. Some of the problems can be solved indirectly by several types of product, but this would probably involve more detailed, time consuming analysis of data.

This table differentiates between real time vehicle tracking (data is downloaded instantly) and retrospective vehicle tracking (data is downloaded when the vehicle returns to base).

Business Problems	Telematics Solutions							
	Driver and Vehicle Data	Real time vehicle tracking	Retro-spective tracking	Trailer Tracking	Text communications	Paperless Manifest and POD	Traffic Information Systems	On-Board Navigation
Poor vehicle MPG	■							
High vehicle maintenance costs	■							
High road accident rate	■							
Unable to measure and therefore manage vehicle MPG	■							
No driver training	■							
Driver trainers don't know where to focus their efforts	■							
Corporate manslaughter liability	■							
High cost of off-route mileage		■	■					
High overtime and overnight costs		■	■					
Inaccurate timesheets		■	■					
Delay on customer site e.g. customer not ready for delivery		■		■				
Poor customer service due to lack of knowledge of vehicle location		■		■				
Time consuming service performance level reporting		■	■					
Driver security and load theft problems		■		■				
Unacceptable standing time and low drop rate		■	■					
Trailer fleet too large, too much standing time				■				
Poor trailer utilisation				■				
High value loads, trailers unattended, sub-contract hauliers				■				

PRODUCT AND SUPPLIER SELECTION

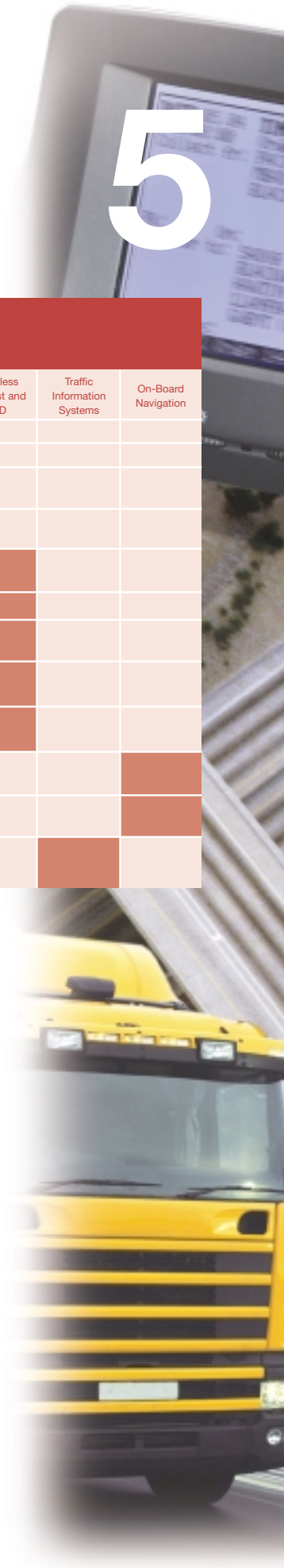
5

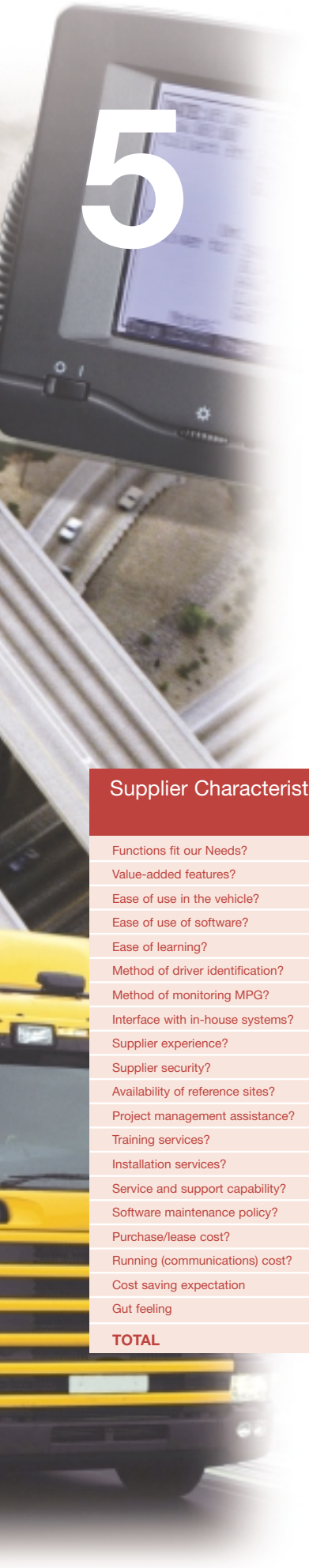
Business Problems	Telematics Solutions							
	Driver and Vehicle Data	Real time vehicle tracking	Retro-spective tracking	Trailer Tracking	Text communications	Paperless Manifest and POD	Traffic Information Systems	On-Board Navigation
No remote monitoring of load temperature		■		■				
High mobile phone costs		■			■			
Too many errors and misunderstandings using mobile phones					■			
Road safety concerns regarding use of mobile phones					■			
Too much manifest paperwork and administration time						■		
Too many delivery and invoice errors						■		
No order status information to provide good customer service						■		
Too many delivery disputes, poor proof of delivery system						■		
Invoicing delayed by errors, disputes, and availability of paperwork						■		
Delays and overtime costs due to trying to locate addresses on multi drop work								■
No accurate ETA information available for customers		■						■
Unpredictable traffic delays frequently interrupting the schedule							■	

Your Company and Telematics

While considering the best type of product functions for your company you should also take an objective and honest view of your resources, strengths and weaknesses. Ask yourself the following questions, and also think of some more that are specific to your operation.

- Has everyone who will be involved in the operation of this system been consulted and had an input into the selection of product functions? Ownership at all levels is vital to success.
- How computer literate are we? Will we be able to get to grips with a feature-rich system or only just scrape the surface of its capability?
- If this system requires a computer network to be installed are we ready for the support and maintenance issues that will arise?
- We like the sound of an internet-based product, but can we get a broadband connection in all our locations? And how much will it cost?
- Can our staff manage the new system in the time they have available? Will we need more staff? Or will it in fact make their role easier and far more effective and efficient?
- If we plan to install an in-cab terminal or keyboard, will all of our drivers be able to operate it?
- How will it be "sold" to the drivers?
- If we do proceed, how will we manage the implementation of this system? With an in-house product champion? With a third party specialist consultant? Or will the supplier provide support?
- Will we truly commit to use this system effectively and train new staff when necessary?
- Do we know which costs are likely to be reduced (and by how much) by effective use of the new management tool? How much more information we will have available? (This is vital so that the product cost can be put into perspective. Calculate a realistic annual saving expectancy.)
- How will it be funded? Cash? Own finance sources? Suppliers finance plan? Will the costs be added to the vehicle contracts? Many contract hire companies are happy to carry out an amendment to the vehicle contract where there is still two or three years of contract life left. Try not to be steered down a certain funding path by the supplier. YOU are the customer and there are plenty of good alternatives open to you.





5 PRODUCT AND SUPPLIER SELECTION

Short Listing of Suppliers

As the potential buyer of a telematics product you are spoilt for choice. Typically, several suppliers will be able to meet your needs but before you make your final choice it is important to go through a **careful selection process**. You should identify a short list of at least three suppliers to talk to directly and provide you with product presentations. Remember that whichever system you go for will require a large investment on your behalf, so don't rush into any decisions.

You can use the table above to identify which type of product is right for your operation, then look at Appendix 1 to look at which supplier can provide this type of system. You should also try and get brochures or information from some of the companies before arriving at your shortlist.

Ideally you should allocate a day for product presentations. It will be helpful if key people from your operation such as those who will use the system are able to attend these presentations.Get in touch with the supplier beforehand to explain what it is you want from a telematics system. This will allow them to tailor their presentation to your needs and to bring along the right hardware. Help them to help you.

It is a good idea to construct a matrix of weighted requirements and supplier characteristics to serve as a score card that can be filled in during the presentations, rather than depend too much upon "gut feeling" at the end. This card can also prompt you with the questions you want to ask each supplier. A typical score card is shown below with one sample entry.

Supplier Characteristic	Weighting 2-4	Supplier 1		Supplier 2		Supplier 3	
		Score/5	x weighting	Score/5	x weighting	Score/5	x weighting
Functions fit our Needs?	4	3	12	5	20	4	16
Value-added features?							
Ease of use in the vehicle?							
Ease of use of software?							
Ease of learning?							
Method of driver identification?							
Method of monitoring MPG?							
Interface with in-house systems?							
Supplier experience?							
Supplier security?							
Availability of reference sites?							
Project management assistance?							
Training services?							
Installation services?							
Service and support capability?							
Software maintenance policy?							
Purchase/lease cost?							
Running (communications) cost?							
Cost saving expectation							
Gut feeling							
TOTAL							

Typical Supplier Score Card
(Supplier score 0 = poor 5 = excellent)

PRODUCT AND SUPPLIER SELECTION

Key Points

The following are some of the key points to consider, questions to be asked during the presentation, or research to be carried out during the selection process.

- **How large is the supplying company in terms of staff and sales turnover?**
  This is a confidence and customer support issue.

- **If you are a large organisation and this is potentially a very large investment you should get hold of the supplier's financial details either directly or via Companies House or similar. Are their finances going in the right direction?**
  Don't necessarily be put off by finances showing a loss or high borrowings. This can be par for the course in the early years of telematics companies.

- **Ask for the details of two or three companies who are already using this system to visit or at least to telephone. These operators should have been using the supplier's product for at least 12 months for applications similar to your own.**

- **Find out which fleets the supplier has already provided systems for? How similar are these operations to your business?**
  This is a bit chicken-and-egg for young suppliers but do you really want to be a pioneer when your business is at state? If so, then be prepared for teething problems and a degree of inexperience in product implementation. However, a young supplier is likely to look after you exceptionally well so the choice is yours.

- **Can the telematics product interface in some way with your existing traffic management or routing and scheduling software?**
  Many salesmen will say "yes it could" but you should be careful about being tempted down the bespoke development route. If you wish to commission a bespoke product try and speak with other companies who have had bespoke solutions from the same supplier.

- **Who installs the product, and who provides repair services?**
  Most companies employ two or three installation and application specialists and then train sub-contract installers for meeting peaks in demand. You should consider the benefits of having your own workshop or vehicle maintenance contractor trained to install and repair the system.

- **What training services and facilities are provided for management, operators, drivers and installation staff?**

- **What assistance, training, motivational tools can they provide to help "sell" the system to the drivers?**

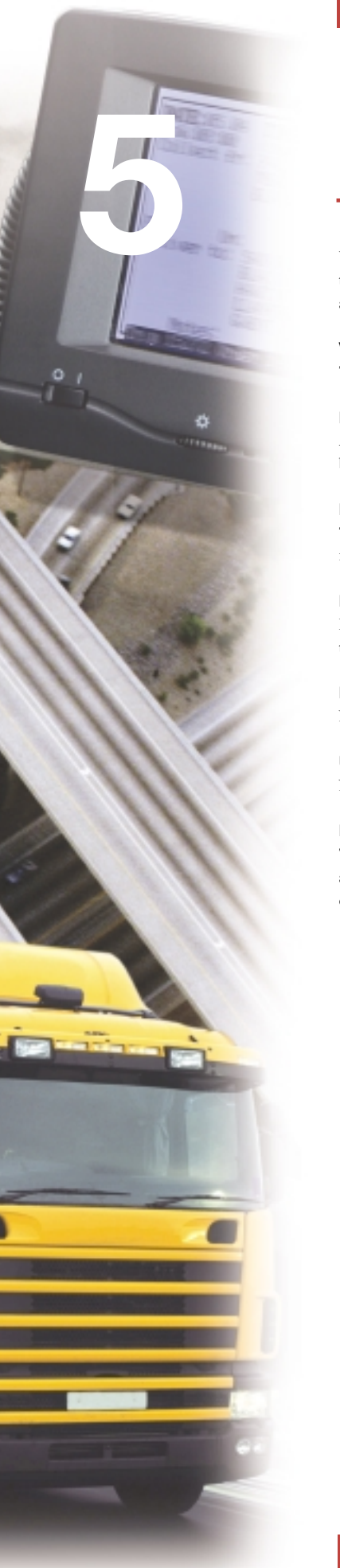
System Costs

Generally speaking, because of the competitive nature of the telematics industry the more you pay the more you get in terms of hardware capability, features, software sophistication and support services.

Lower cost systems are available and these provide a simple-to-operate, quickly implemented, affordable solution for smaller fleet operators who wish to remain competitive with larger fleets.

Sophisticated applications made up of several pieces of on-board hardware, networked software and integration with third party software would typically cost between £1500 and £3000 per vehicle. However finance is usually quoted ranging from £40 to £70 per vehicle per month depending upon the supplier, functions provided and finance period. Typical straightforward vehicle tracking systems are at the bottom end of this price range. Several are now available for under £1000 though these usually have fewer functions and limited scope for expansion.

If the system is correctly used, this cost will be returned many times over. As the very simplest cost benefit analysis consider your two largest variable costs, fuel and labour. Reduce them both by a very conservative 5%.This represents the minimum saving that can be achieved by good use of telematics systems and compare this with the above rough cost guidelines. This simple calculation normally suggests a rapid return on investment even before considering the less tangible benefits such as improved customer service. Try again with a 10% reduction, which is not entirely unrealistic, and the case for implementing a telematics product is likely to become compelling.



5 PRODUCT AND SUPPLIER SELECTION

When you request a quote from your supplier expect to see an itemised breakdown detailing some if not all of the following:

Vehicle Equipment:
This may be itemised to component level

Installation of Vehicle Equipment:
A fixed price per vehicle (or for the total order) is better than open-ended labour and travelling costs

Management Software Licence:
This might be a one-off fee or an annual fee incorporating software maintenance

Management Software Maintenance:
For the provision of software updates and continued telephone support

Driver Training or Briefing:
Normally a daily charge

User Training:
Normally a daily charge

Project Management:
This is charged by some suppliers on larger projects and is usually cheap and effective compared to your own implementation management costs

Monthly Access Fee:
(Internet-based systems)
(Internet-based systems) - this could include the cost of calling up to find vehicle locations, if it doesn't then you need to calculate the communication costs separately.

If communication costs aren't included in the supplier's quote then you need to predict your monthly expenditure against an anticipated profile of use. The supplier should be able to assist you here.

As a simple example, calculate this:
(Cost/month/vehicle x number of vehicles x 12)
+ (monthly expected communications cost x 12)
= Total Annual Cost

Management time should also be taken into account but it shouldn't play too large a part in your calculations since the use of a telematics system is going to make your operation far more productive and efficient. But beware of getting bogged down in detail - when suddenly faced with a wealth of new and 'interesting' information about what's happening "out there", you can easily spend a lot of time without producing much benefit. **Focus on the big issues** and the returns will follow.

IMPLEMENTATION OF A NEW TELEMATICS SYSTEM

If you choose to fit a simple system on a small number of vehicles then implementation can be quite straightforward. But, if you decide to buy a more complex system for a large number of busy vehicles then implementation will be a logistical exercise that requires careful planning. You should review how a potential supplier could assist in this planning.

Detailed implementation phases will be different for different telematics products but the common key steps should include:

- Appointment of internal product champion
- Identify the skills required to use the system and which staff will operate the new system
- Identify any new computer hardware, network or internet requirements as early as possible. Take the needs of the end-users into account when specifying equipment
- Make full use of any project management services offered by the supplier
- Identify the key deliverables and milestones, for example:
  - Staff briefings (to include all drivers and system operators) to describe how **and why** this new technology is being introduced
  - Purchase of new computer equipment
  - Set up of Internet connection where necessary
  - Vehicle installations – dates and locations
  - Installation and commissioning of management software
  - Driver training
  - Software user training
  - Review meeting with the supplier to verify correct operation, clear up final queries and "sign off" the implementation

Physically installing a telematics system to a vehicle can take from one hour for a basic tracking system up to six hours for a full driver and vehicle monitoring system using fuel consumption meters.

Effective training is vital to a successful rollout. This should include some **motivational elements** to make sure that staff accept the system and understand their role in making the system a success for the company. Training should be in a formal environment, even if it's just a quiet spare office, away from telephones and other interruptions.

Regular review meetings should be held with operational staff to make sure that the system is being used to its full potential, helping you achieve maximum benefits. Ideally a company director should verify any available Key Performance Indicator (KPI) reports every month, e.g. for vehicle MPGs or utilisation levels, examining both the trends in the KPIs and making sure that the system is being used correctly.

Product Trials

Initially you will probably be tempted to install the system into two or three of your vehicles in order to trial the system and estimate the benefits achieved. But beware, small-scale trials can be unproductive and a waste of time.

For example, if you fit two or three of your vehicles with a telematics system, typical problems and issues are:

- Operational staff too busy to put effort into using a new "gizmo" that the directors have found! Trial not taken seriously by staff
- The system isn't used regularly by staff during a trial, so it doesn't form part of their normal working practices. Any training is fast forgotten. System not used to its full benefit.
- Small-scale trials produce results or conclusions that may not be statistically representative of the effect across the whole fleet. Lack of sufficient confidence or evidence to convince the board that a roll-out across the fleet is financially justified
- Trials often extend for months beyond the planned "trial period" consuming valuable management time in trying to quantify the benefits. Especially in the face of the above hurdles.

6

IMPLEMENTATION OF A NEW TELEMATICS SYSTEM

If you have analysed your company's needs, gone through a proper supplier selection process and visited reference sites, then deciding to perform a small scale trial is cautious in the extreme and is doing your company no favours. If you have done the proper groundwork then the first installations should be part of a programme of work to equip your whole fleet.

For multi-depot operations, the smallest depot is usually equipped first.This allows the implementation plan to be tested and for any teething problems to be ironed out before moving to implementation in the larger depots. Clearly, if you operate from a single location then it is even more important that the implementation programme is carefully thought out in line with the pointers at the start of this section

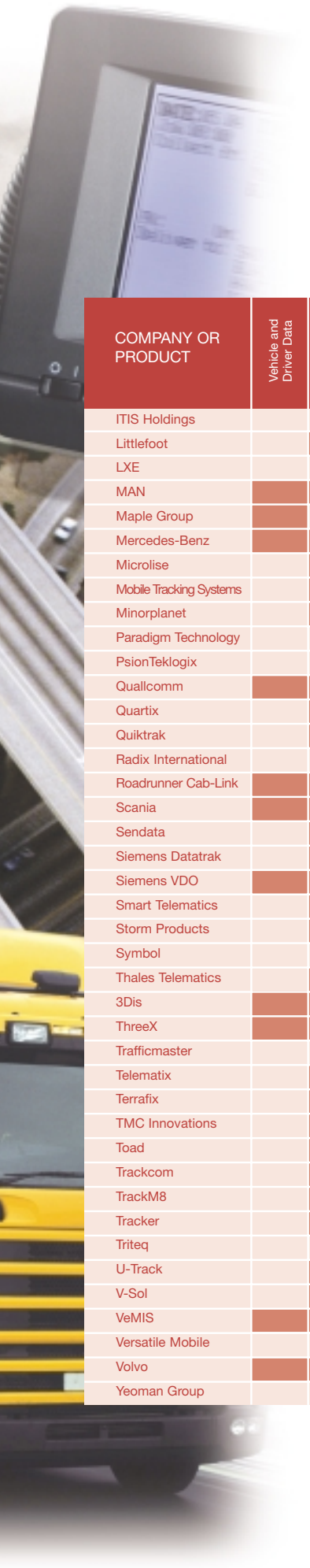
A carefully planned system selection and implementation exercise can be painless and rewarding. Drivers and operational staff will be happy and satisfied that the new system is in the interests of all concerned and will be keen to use it effectively. It will operate reliably with no nasty surprises in the way of unreliability or high running costs allowing you to reap the full business benefits.

APPENDIX 1 INDEX OF SUPPLIERS

The following is a list of UK telematics suppliers along with an indication of the type of telematics functions they offer.

The use of the many brand names has been avoided in favour of company names or the name used in the website address to avoid confusion. The seven telematics functions shown have been gathered from publicly available material but particularly from suppliers' websites. Some suppliers may be able to provide additional products or services but these were not explicitly advertised at the time of the research. This is not intended to be a complete index of suppliers since new companies, lower profile companies or companies that provide some telematics products or services amongst a much wider portfolio of products may have been omitted.

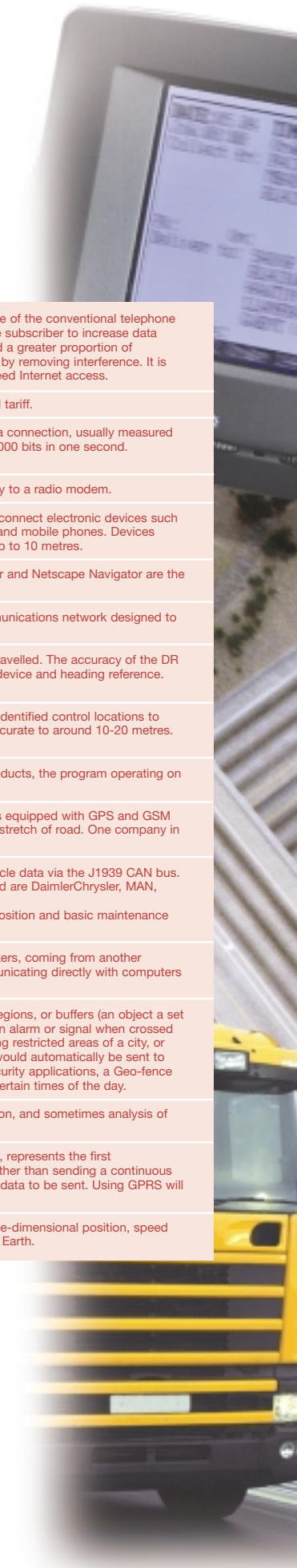
COMPANY OR PRODUCT	Vehicle and Driver Data	Vehicle tracking	Text Messaging	Trailer Tracking	Paperless Manifest and/or POD	Traffic Information Systems	On-board Navigation	WEBSITE ADDRESS	TELEPHONE NUMBER
Alcatel Mobicom		■	■	■				www.alcatel.com/mobicom	0161 954 3050
Andronics		■	■	■				www.andronics.co.uk	028 7127 3100
APD Communications		■	■		■			www.apdcomms.co.uk	01482 808300
Auto-Q	■	■	■	■	■		■	www.auto-q.com	0870 873 1250
Avantgo					■			www.avantgo.com	020 7776 4200
Belgravium	■	■	■		■			www.belgravium.com	01274 741860
Box Telematics	■	■	■					www.boxtelematics.com	01675 434200
BT Redcare	■	■	■					www.redcare.bt.com/fleet/	02476 492358
Corporate Eye		■	■					www.corporate-eye.co.uk/website/index.cfm	07770 334 343
CS Electronics		■	■	■	■			www.cselectronics.co.uk	01785 223000
C-Track		■						www.c-track.co.uk	0161 848 1579
Carbug		■	■				■	www.carbug.co.uk	020 7222 7284
Cognito			■		■			www.cognitoltd.com	01635 508200
Cummins Road Relay	■	■	■					www.cummins.com	020 8700 6000
Cybit		■	■			■	■	www.fleetstar.co.uk/uk	01234 759384
Cyfas		■	■					www.cyfas.co.uk	01767 313704
ERF	■	■	■		■			www.man.co.uk	01793 448000
Eagle Eye		■	■	■			■	www.eagle-eye.co.uk	01928 795 400
Easy-trac		■		■				www.easy-trac.com	01422 311557
Foden Trucks	■	■			■			www.foden.com	01270 758400
Gpxt		■			■			www.gpxt.com	08700 463344
Groenveld	■	■	■		■			www.groeneveld-groep.com	01509 600033
HHP					■			www.handheld.com	01925 240055
ICS Black Box	■	■	■		■			www.boordcomputer-black-box.nl	01509 600185
Intermec			■		■			www.intermec.co.uk	0118 923 0800
Isotrak	■	■	■	■	■			www.isotrak.com	01908 540710



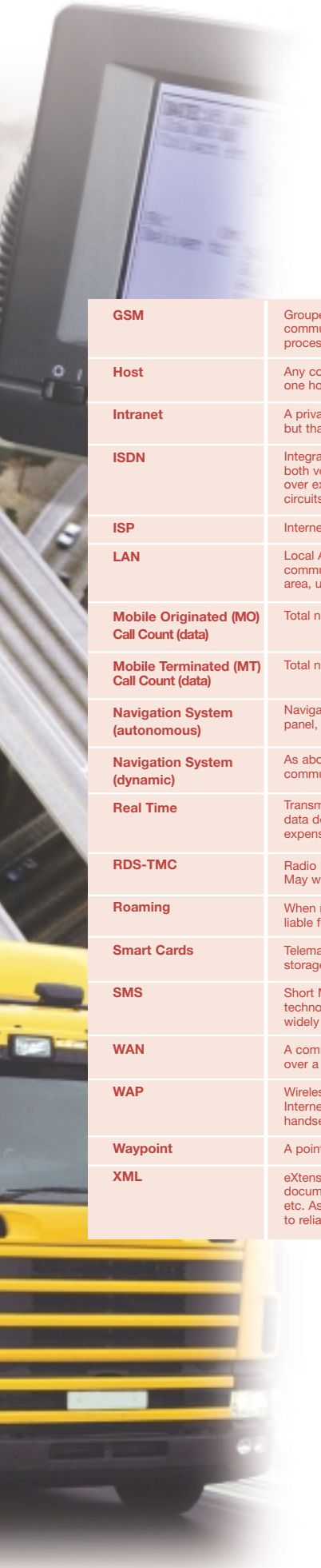
APPENDIX 1 INDEX OF SUPPLIERS

COMPANY OR PRODUCT	Vehicle and Driver Data	Vehicle Tracking	Text Messaging	Trailer Tracking	Paperless Manifest and/or POD	Traffic Information Systems	On-board Navigation	WEBSITE ADDRESS	TELEPHONE NUMBER
ITIS Holdings						■	■	www.itisholdings.co.uk	0161 929 5788
Littlefoot		■			■			www.scanbarcode.co.uk	0118 9011703
LXE					■			www.lxe.com	01494 464680
MAN	■	■	■		■			www.man.co.uk	01793 448000
Maple Group	■							www.mapletechnology.co.uk	0161 477 3476
Mercedes-Benz	■	■	■		■			www.vemis.com	01827 311912
Microlise		■	■	■	■			www.microlise.com	01773 713 311
Mobile Tracking Systems		■	■		■		■	www.mobiletrackingsystems.com	01489 571500
Minorplanet		■	■	■				www.minorplanet.com	0113 3836300
Paradigm Technology					■			www.paratech.co.uk	01235 750602
PsionTeklogix					■			www.psionteklogix.co.uk	01494 450666
Quallcomm	■	■	■	■	■		■	www.qualcomm.com/qwbs	01844 261111
Quartix		■						www.quartix.co.uk	01223 564434
Quiktrak		■	■		■			www.quiktrak.co.uk	0870 0106044
Radix International					■			www.radix-intl.com	01908 568192
Roadrunner Cab-Link	■	■	■	■	■			www.roadrunnercablink.com	01923 460000
Scania	■	■	■					www.infotronics.scania.com	01908 210210
Sendata		■	■	■				www.sendata.co.uk	01656 656591
Siemens Datatrak		■	■		■			www.siemens-datatrak.com	01793 500108
Siemens VDO	■	■	■					www.my-fis.co.uk	0121 32612 34
Smart Telematics		■	■	■	■			www.smarttelematics.co.uk	01788 577110
Storm Products		■	■	■				www.cvcs.co.uk/storm/g-master.html	01355 247921
Symbol			■		■			www.symbol.com/uk	01925 818759
Thales Telematics		■	■	■				www.thalestelematics.com	020 8974 1100
3Dis	■	■						www.3dis.co.uk	0118 9760 801
ThreeX	■	■	■		■			www.threex.co.uk	01756 703800
Trafficmaster						■	■	www.trafficmaster.co.uk	08705 561712
Telematix		■	■		■			www.telematix.co.uk	01980 609080
Terrafix		■	■					www.terrafix.co.uk	01782 577015
TMC Innovations		■		■				www.tmc-innovations.com	01295 817 621
Toad		■						www.toadplc.com	020 8710 4000
Trackcom		■						www.trackcom.com	01908 288288
TrackM8		■						www.trakm8.com	0870 770 1697
Tracker		■	■	■				www.tracker-network.co.uk	01895 45 50 45
Triteq				■				www.triteq.com	01488 684554
U-Track		■					■	www.u-track.co.uk	-
V-Sol		■	■				■	www.v-sol.co.uk	01772 699980
VeMIS	■	■	■		■			www.vemis.com	01827 311912
Versatile Mobile					■			www.versatilemobile.com	01483 721515
Volvo	■	■	■		■			www.volvotrucks.volvo.co.uk	01926 401777
Yeoman Group						■	■	www.yeomangroup.plc.uk	01590 679777

APPENDIX 2 GLOSSARY OF TERMS



ADSL (Asymmetric Digital Subscriber Line)	A technology designed to enhance the performance of access networks, particularly the subscriber line of the conventional telephone copper access network. Two modems are used, one on the customer's premises, and the other on the subscriber to increase data transfer rates. ADSL uses a line splitter to enable it to carry voice, upstream data (user to network) and a greater proportion of downstream data (network to user). Filtering at both ends of the line ensures acceptable voice quality, by removing interference. It is relatively inexpensive, and therefore constitutes an attractive alternative to cable networks for high speed Internet access.
Airtime	The amount of time "on-air" when using a wireless data service that is billed per minute at a published tariff.
Bandwidth and 'Broadband'	The ability of a medium to transmit high speed data. It defines how much data you can send through a connection, usually measured in bits-per-second. A full page of English text is about 16,000 bits. A fast modem can move about 57,000 bits in one second. 'Broadband', can move data about 10 times quicker.
Base Station	The fixed receiving and transmitting radio station for vehicle data. This may be a PC connected directly to a radio modem.
Bluetooth	Low power radio technology being developed with the objective of replacing cables currently used to connect electronic devices such as personal computers, printers and a wide variety of handheld devices such as palm top computers and mobile phones. Devices equipped with Bluetooth should be capable of exchanging data at speeds up to 720kbit/s at ranges up to 10 metres.
Browser	A Client program (software) that is used to look at various kinds of Internet resources. Internet Explorer and Netscape Navigator are the more popular clients.
CAN bus (J1939)	Controller Area Network. Most new heavy vehicles now have a CAN bus. J1939 is a high speed communications network designed to support control functions between electronic devices distributed throughout a vehicle.
Dead Reckoning	A Dead Reckoning (DR) position is one based on estimating the distance and the direction you have travelled. The accuracy of the DR position depends on the accuracy of the initial position and the accuracy of your distance measuring device and heading reference. The addition of other information turns a DR position into an estimated position.
Differential GPS	A technique for overcoming GPS position determination errors; GPS receivers are placed at precisely identified control locations to measure the difference between indicated GPS positions versus actual positions. GPS systems are accurate to around 10-20 metres. Differential GPS can further increase accuracy to 1 – 5 metres.
Firmware	A term used to describe software that is 'permanently' programmed inside hardware. In telematics products, the program operating on the vehicle hardware is generally described as the firmware.
Floating Vehicle Data	The automatic processing and analysis of traffic conditions and journey times using data from vehicles equipped with GPS and GSM technology. The data from "probe" vehicles is aggregated to determine the average speed for a given stretch of road. One company in particular is spearheading this technology in the UK.
FMS-Standard	An agreement between several major truck manufacturers to give third parties access to top level vehicle data via the J1939 CAN bus. In January 2002 two more truck manufacturers joined the fms-standard group. The companies involved are DaimlerChrysler, MAN, Scania, Volvo, DAF Trucks, and IVECO. Top level data includes speed, revs, fuel, brake switch, cruise control, PTO status, accelerator pedal position and basic maintenance information.
Firewall	A security system intended to protect an organisation's network against external threats, such as hackers, coming from another network, such as the Internet. A firewall prevents computers in the organisation's network from communicating directly with computers external to the network and vice versa.
Geo-fence	A geo-fence is a pre-defined geographic area of a map and may include rectangles, circles, ellipses, regions, or buffers (an object a set distance around other objects). A geo-fence can be regarded as a "virtual boundary" that will trigger an alarm or signal when crossed by a vehicle. As an example, a fleet traffic manager may want to restrict certain vehicles from accessing restricted areas of a city, or advise a customer that delivery arrival is imminent. By defining a geo-fence around the area, an alert would automatically be sent to the manager or customer by whatever means is provided by the product supplier. Alternatively, for security applications, a Geo-fence can be set so that a vehicle is remotely disabled or an alert is triggered if the boundary is crossed at certain times of the day.
GIS	Geographical Information Systems - A computer system that contains maps and geographic information, and sometimes analysis of geographic data.
GPRS	General Pack Radio Service, which has been standardised as part of the GSM Phase 2+ development, represents the first implementation of packet switching within GSM, which is essentially a circuit switched technology. Rather than sending a continuous stream of data over a permanent connection, packet switching only utilises the network when there is data to be sent. Using GPRS will enable users to send and receive data at speeds of up to 115kbit/s.
GPS	Global Positioning System refers to satellite-based radio positioning systems that provide 24 hour three-dimensional position, speed and time information to suitably equipped receivers in vehicles anywhere on or near the surface of the Earth.



APPENDIX 2 GLOSSARY OF TERMS

GSM	Groupe Speciale Mobile; European digital cellular radio standard for pan-European mobile cellular radio network two way communications. Links mobile and base stations. Vehicles equipped with GSM must be dialled individually, this is an automated process in the better telematics products where driver and vehicle data is being acquired.
Host	Any computer on a network that is a repository for services available to other computers on the network. It is quite common to have one host machine provide several services, such as SMTP (email) and HTTP (web).
Intranet	A private network inside a company or organisation that uses the same kinds of software that you would find on the public Internet, but that is only for internal use.
ISDN	Integrated Services Digital Network Digital. Telecommunication lines that can transmit up to 128 Kilobytes of information, including both voice and digital services, and which are much faster than traditional analogue lines. ISDN is basically a way to move more data over existing regular phone lines. ISDN is available to much of Europe and is priced very comparably to standard analogue phone circuits.
ISP	Internet Service Provider eg BT, AOL, MSN, Freeserve, Demon etc
LAN	Local Area Network. A group of computers and other devices dispersed over a relatively limited area and connected by a communications link that enables any device to interact with any other on the network. A computer network limited to the immediate area, usually the same building or floor of a building.
Mobile Originated (MO) Call Count (data)	Total number of calls initiated from a mobile to the host.
Mobile Terminated (MT) Call Count (data)	Total number of calls initiated from the host to the mobile.
Navigation System (autonomous)	Navigation Systems that do not benefit from the receipt of live traffic data. Such systems typically consist of a map display and control panel, CD Player and CD-ROM containing route information.
Navigation System (dynamic)	As above, but the information changes based on the current traffic conditions, an in-vehicle transponder is included capable of communicating with an external infrastructure.
Real Time	Transmission of information, without storage, as and when received. In reality, many telematics systems that claim to provide real time data do not since anything but mission critical data is initially stored in memory for a period of time. True real time data would be expensive in fleet operations.
RDS-TMC	Radio Data System-Traffic Message Channel. The transmission of traffic condition information over the FM channels' "sub-carrier". May well revolutionise in-cab navigation systems enabling automatic re-routing in the event of traffic incidents ahead.
Roaming	When mobile data users are abroad, their digital phone will use GSM to connect to a network within that country. The customer is then liable for call charges applied by that network, and is therefore known as 'roaming' on that network.
Smart Cards	Telematics suppliers' driver identification or data cards are often described as Smart Cards though these often only provide data storage and have no intelligence built into them.
SMS	Short Messaging Service. A popular wireless standard for transmitting text based messages. SMS is an inherent part of GSM technology. The service is a two-way "store and forward" messaging service with a maximum message size of 160 characters. SMS is widely used in commercial vehicle telematics to send both vehicle location and text message data.
WAN	A communications network that connects geographically separated areas. A network in which computers are connected to each other over a long distance, using telephone lines and satellite links.
WAP	Wireless Application Protocol. WAP is a technology designed to provide users of mobile terminals with rapid and efficient access to the Internet. WAP integrates telephony services with (so called) micro-browsing and enables easy-to-use Internet access from a mobile handset. Typical WAP applications include over-the-air e-commerce transactions, online banking, and messaging.
Waypoint	A point, circle or rectangle defined by geographic co-ordinates used in navigation or historic analysis reports.
XML	eXtensible Markup Language is a widely used system for defining data formats. XML provides a very rich system to define complex documents and data structures such as invoices, molecular data, news feeds, glossaries, inventory descriptions, real estate properties, etc. As long as a programmer has the XML definition for a collection of data (often called a "schema") then they can create a program to reliably process any data formatted according to those rules.

transportenergy
BESTPRACTICE

TransportEnergy Best Practice programme provides authoritative, independent information and advice to help implement sustainable transport initiatives. This information is disseminated through publications, videos and software, together with seminars, workshops and other events. For further information visit our website at **www.transportenergy.org.uk/bestpractice** or contact the Helpline **0845 602 1425**

Printed on paper containing 75% post-consumer waste and 25% elemental chlorine free pulp.